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ABSTRACT

This thesis is composed of two studies which look at the impact of exposure to schooling on achievement growth of children. Both use data from the National Follow Through Evaluation. The first study investigates the hypothesis that the difference in achievement growth between poor and non-poor children is greater during the summer months than during the school year. This hypothesis is studied with achievement test and background data on approximately 1000 children in kindergarten through second grades from Philadelphia. The data are analyzed in three ways, and the three analyses are seen to produce roughly the same pattern of results. Under each approach, the first grade results provide strong support for the hypothesis, while the second grade results provide moderate support, with kindergarten results being inconclusive. The second study involves an analysis of data from a small experiment designed to test the hypothesis that participation in a summer program increases achievement growth and that this increase is maintained throughout the following school year. The findings from three of the four programs used are quite similar and indicate that the programs do have a substantial short term effect on achievement, and that a portion of this effect is maintained throughout the following school year. (Author/AM)

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SUMMER STUDY:
A TWO-PART INVESTIGATION OF THE IMPACT OF EXPOSURE TO SCHOOLING ON ACHIEVEMENT GROWTH

by

JANE LISA DAVID

A Thesis
Presented to
the Faculty of the Graduate School of Education
of Harvard University

in partial fulfillment of
the requirements for the degree of
Doctor of Education

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DEDICATION

To JD without whose constant support, toleration and perseverance this work could not have been completed.

The bulk of the work for this dissertation was originally done at the Huron Institute for the Follow Through Branch of the Office of Education under Contract # OEC-0-72-0718. The conclusions and recommendations are those of the author and do not necessarily reflect the views of any federal agency.

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ABSTRACT

This thesis is composed of two studies which look at the impact of exposure to schooling on achievement growth of children. Both use data from the National Follow Through Evaluation.

The first study investigates the hypothesis that the difference in achievement growth between poor and non-poor children is greater during the summer months than during the school year. This hypothesis is studied with achievement test and background data on approximately 1,000 children in kindergarten, first and second grades from Philadelphia. These data are analyzed in three ways. The first analysis relates the difference in school year growth and summer growth to several background measures. The second compares the differences in scores between poor and non-poor groups at each test point. The third compares the coefficients of background measures in pairs of regression equations predicting end of summer and end of school year scores. The three analyses produce roughly the same pattern of results. Under each approach, the first grade results provide strong support for the hypothesis. The second grade results provide moderate support and the kindergarten results are inconclusive.

The second study involves an analysis of data from a small experiment designed to test the hypothesis that participation in a summer program increases achievement growth and that this increase is maintained throughout the following school year. The data are from four summer programs to which children were randomly assigned. The data from one of the projects were not interpreted because they indicated that the experimental and control groups were intially very different. The findings from the other three programs are quite similar and indicate that the summer programs do have a substantial short term effect on achievement and that a portion of this effect is maintained throughout the following school year.

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INTRODUCTION

Research on factors which affect achievement growth indicates that existing variation in social background explains more of the variation in achievement growth than does existing variation on other measures such as school resources. This is often misconstrued as evidence that schools are not effective. Another body of research looks at the impact of variation in exposure to schooling rather than variation in the particular features of schools. This body of research suggests that where substantial variation exists--for example, children with and without school for a year--schooling does have a positive impact on achievement. While such studies do not identify the factors associated with schooling which affect achievement, they do suggest that something about schooling is important.

Given that both background and exposure to schooling affect achievement, and given major concern over the differences in achievement growth between poor and non-poor children, it is logical to consider background and exposure together. Does exposure to schooling reduce the difference in rates of achievement growth of poor and non-poor children? One way to study this question is to compare the poor/non-poor difference in growth rates during periods with and without school. The only naturally occurring period without school for many school-age children is the summer months. Thus one question this study proposes to investigate is whether the growth rates of poor and non-poor children are more different during the summer months than during the school year.

If the gap between poor and non-poor children increases more rapidly during the summer than during the school year, one obvious concern is the impact of summer school on growth rate. Thus a second question this study tackles is whether growth rates differ between a sample of children who have attended summer school and a comparable group of children who did not attend summer school.

Ideally, these question should be answered on one study. But due to limitations in the data available for this thesis, two studies were done which used two separate samples. The question of differential growth rates for poor and non-poor children during school as compared with the summer was studied with a sample of approximately 1,000 children in kindergarten through second grade. The question of the impact of summer school was investigated with a sample of children from four locations in which summer programs were held. In these location, children were randomly selected for participation in the summer program.

The data for both samples are from the National Follow Through Evaluation under the U. S. Office of Education.

Follow Through is a federally funded program of compensatory education for disadvantaged children in kindergarten through third grade. The key feature of the program is its planned variation design which involves the implementation of a variety of curriculum models in a total of almost two hundred projects. A subset of these projects as well as a sample of comparison children--those in classes without a Follow Through model--were tested as part of the National Evaluation. The data for the first sample in this thesis come from three Follow Through projects and their comparison groups in Philadelphia. The data for the second sample come from four Follow Through projects which had summer programs in which random assignment was dictated by the U. S. Office of Education.

The remainder of this report is organized as follows. Chapter I presents the relevant background research. Chapter II describes the Philadelphia sample and Chapter III describes some analysis issues. Chapters IV-VI present three analyses of the Philadelphia data and Chapter VII describes the summer program experiment. Finally, Chapter IX presents a summary of the conclusions from both studies.

CHAPTER I

BACKGROUND RESEARCH

Overview

There has been considerable research on the factors related to a child's achievement in school. Relationships between child background characteristics, school resources and achievement have been studied throughout the century. A large number of studies have found relationships between achievement level or gains and various measures of socioeconomic status (for example, Acland, 1973 and Coleman *et al.*, 1966). Other studies have documented the lack of differential impact of varying amounts of school resources (see Averch *et al.*, 1972 for a critical review of selected studies). The consensus today seems to be that variations in children's background characteristics are much stronger predictors (albeit not very strong) of variation in children's achievement than are variations in school resources. This has led some to conclude that schools are not effective, although this extreme interpretation is not supported by the research.

Another body of research suggests that schools are effective. This research consists of studies which look at variations in exposure to schooling instead of particular characteristics of schools, and it suggests that schooling does have a positive impact on achievement. Accepting the findings that child background characteristics and exposure to schooling predict or influence achievement, it seems valuable to consider these sets of variables together. Thus this thesis looks at the relationship between social background, exposure to schooling and achievement growth.

For most school age children, exposure to schooling during the school year does not vary considerably. The only naturally occurring period without school is during the summer months. Thus this thesis considers the relationship between social background, exposure and achievement growth during the summer.

Ideally such an investigation should be carried out on one data set with a nationally representative range of social background. Due to the limitations in the data available for this work, however, two data sets were employed to answer two separate questions. The first study compares the difference in growth rates between poor and non-poor children during the summer and during the school year. The second assesses the impact of several summer programs to which children were randomly assigned.

Studies of Background Characteristics

The literature on the relationship between achievement and child background characteristics is familiar to the educational community, stemming primarily from the Coleman report (1966), the subsequent reanalyses of these data in Mosteller and Moynihan (1972), and *Inequality* by Jencks *et al*. (1972). Thus this section will not present a review of these studies. Rather, the review will concentrate on those studies which consider exposure to schooling as the variable of interest.

Studies of Exposure to Schooling

Exposure to schooling can be studied in a number of ways. For the purposes of this discussion I have divided the research into two broad categories: extensive variation and minimal variation. Under the first category I consider three types of studies. First are studies which compare achievement growth for children with and without school during the school year. Second are studies which compare children with and without summer school. The third are studies which compare children's rates of growth during the school year and during the summer. Under the category of minimal variation, I consider three types of studies of achievement: those which look at the length of the school day, the length of the school year, and absenteeism.

Finally, I consider the handful of studies which investigate social background, exposure and achievement together. These studies are similar to one set of exposure studies--those which compare children's rates of growth during the school year and during the summer. But these have in addition social background measures and attempt to relate differences in growth over the summer and the school year to background characteristics.

Before reviewing the research on exposure, it is important to make a distinction between what is actually measured by exposure and background and what is really of interest. Exposure to schooling is a gross measure of the characteristics of schooling which affect achievement. These characteristics are probably those related to instruction, such as amount of time spent in instruction of a particular subject and efficiency of that instruction (see Carroll (1963) for a generalized model of factors affecting learning). The same sort of proxy relationship exists for background measures. For example, I assume that it is not the actual number of years of a mother's education which affects her child's achievement but, rather, that such a measure reflects something about the child's experiences. One can speculate that a poorly educated mother may be unable to read well and thus has few books in the house and rarely reads to her child, and these are the factors which directly affect the child's learning.

Studies of Exposure to Schooling with Extensive Variation

The simplest way of studying the effects of exposure to schooling is to compare similar children who have and have not attended school over a period of time. There are rarely opportunities to study the effects of schooling versus no schooling during the school year on children of elementary school age; however, two naturally occurring instances of cancellation of school have afforded opportunities to investigate this issue. From 1959 to 1963 the schools in Prince Edward County, Virginia, were closed to avoid desegregation. When the schools reopened, children who had not attended any school during the break scored substantially below similar children who had on a variety of measures (Green et al., 1964). In Holland during World War II many elementary schools were closed. A study of one secondary school after the war attributed a loss of more than four IQ points to this lack of schooling (de Groot, 1948 and 1951).

Comparing groups with or without schooling during the school year can be interpreted in another way; namely, exposure to a particular subject. The most obvious example of this does not need supporting research; for instance, children who are exposed to one subject such as algebra will probably do better on a test of that subject than children who have not been exposed to the material. An extension of this interpretation is to compare groups of children who have had more years of a given subject than a comparable group of the same age. For example, it seems reasonable that children who have studied two years of French would perform better on French tests than children with one year of French. Preliminary reports presented at a conference of the International Association for the Evaluation of Education Achievement (IEA) support this illustration (Postlethwaite, 1973).

Another situation which permits comparisons of children with and without school is that of preschool attendance. Stearns (1971) summarizes much of the preschool research which on the whole demonstrates that children with preschool do better on achievement tests than children who have not attended, although most follow up studies indicate that such gains are not maintained. This finding of short term effects is also supported by the most recent evaluation of Head Start Planned Variations (Weisberg, 1973).

For elementary school children, the best opportunity for a study of children with and without school is during the summer months. This review will not attempt to summarize previous evaluation efforts of summer programs because of the marginal relevance of most of the work to estimating effectiveness. This stems from my discovery that no studies of summer school include both an adequate control group and an assessment of long-term effects. (See Austin et al. (1972) for a review of several such studies.)

Another way of studying the impact of exposure to schooling is to compare children's rates of growth during the school year to their growth over the summer. Such a comparison requires three data points in order to have a measure of learning during the summer and during the school year. Three studies done in the 1920's permit such comparisons (Brueckner, 1927; Morgan, 1929; and Nelson, 1929). While none reports on summer school attendance, each study finds in general that losses occur over the summer while gains occur during the school year. Parsley and Powell (1962) use four data points although they only report difference scores for the school year and the summer. The scores are reported in grade equivalents and show overall that children are gaining at least a full grade equivalent during the school year and either losing or gaining relatively less during the summer (after adjusting for the different lengths of the two periods). Beggs and Hieronymus (1968) report on the norming data for the Iowa Test of Basic Skills. They find consistent losses over the summer in some subjects and no patterns in others. Finally, Soar and Soar (1969) compare summer and school year growth on four subtests and find that, adjusting for length of the intervals, summer learning is only slightly less than school learning.

Overall, the evidence is consistent in supporting the contention that considerable variations in exposure to schooling are reflected in achievement scores.

Studies of Exposure to Schooling with Minimal Variation

Exposure with minimal variation includes studies of the relationship between achievement and the length of the school year, the length of the school day and absenteeism. The fact that these are considered to have minimal variation implies only that these variables had limited variation in most of the studies reviewed. It does not imply that there are not situations in which considerable variation can be observed on one or more of the variables.

Little research exists on the length of school year perhaps because variability is generally quite limited within a given region of the country. The Coleman data show no appreciable relationship between the length of school year and achievement in a sample of Northern elementary schools, but the range was only from 175 to 190 days per year (Jencks, 1972). A small study in Kansas in 1928 compared scores from sets of schools with seven and eight month school years, respectively. There was no consistent difference at the end of the eighth grade between the two groups which by then differed by seven months of school (O'Brien, 1928).

The little research available on the length of the school day indicates little relationship between length of school day and achievement (Jencks, 1972).

Studies of absenteeism have attempted to relate number of days absent to achievement gains. The findings of such studies are inconclusive, primarily because it is impossible to separate the effects of factors which lead to high absenteeism from the effect of days absent (for example, Roselle, 1968; Ziegler, 1928; and Denworth, 1928). One study in England attempted to separate the effects and suggests that excessive absences do have a detrimental effect on achievement particularly if there are frequent episodes of absence as opposed to a few long ones (Douglas and Ross, 1965).

Additionally, there is one study which considers length of school day and school year and attendance together. Wiley (1973) calculates a measure of school exposure by taking the product of a school's average daily attendance, length of day and length of year. This produces a variable with considerable variation. He finds a small relationship between exposure and achievement: that an increase of 11 percent in exposure would increase verbal and reading scores one point and a 28 percent increase in exposure would increase mathematics one point. But given that the exposure variable is calculated at the school level, it is unjustified to make inferences at the individual level in spite of the author's attempts to do so.

In conclusion, while large variations in exposure appear to have a detectable impact on achievement, minimal variations do not. This suggests that schooling is an important determinant of achievement but that small variations in exposure do not reflect real variation in the characteristics of schooling which affect achievement. This could well be because measures such as length of school day and length of school year do not reflect much variation at all in total amount of instruction time.

Studies of Background and Exposure

Given that variation in social background and large variation in exposure are reflected in variation in achievement, it is logical to consider these three variables together. Is there a relationship between achievement growth during periods of schooling and non-schooling and social background? Stating this in terms of school effects, it suggests that schools may be having a strong impact by reducing inequalities which exist apart from school. In other words, schools may weaken the effects of home environment. I have located only three studies which tackle this question (Hayes and Grether, 1969; Shapiro _et al_., n.d.; and Heyns, in progress). These three studies relate measures of social background to differential rates of learning over the summer months and the school year. Both Hayes and Grether and Shapiro _et al_. conclude that the difference in rates of growth between poor and non-poor children over the summer is greater than during the school year. The authors also conclude that this effect is cumulative and by the end of elementary school accounts for much of the gap between rich and poor children. Preliminary data from the Heyns study also support the notion that the poor/non-poor difference is greater over the summer than over the school year.*

The Hayes and Grether study involved some 600 New York City elementary schools which were tested in grades 2-6 with portions of the Metropolitan Achievement Test (MAT) in fall/spring 1965-1966 and 1966-1967. The authors classified the schools into six social class levels on the basis of racial composition and economic level of the neighborhood. The fall and spring data were analyzed across grade levels as if they were longitudinal. The authors state that the major finding is that a disproportionate amount of the difference found between the extreme groups (poor blacks and non-poor whites) at the end of sixth grade is explained by differential rates of growth over the summer months and that the intermediate social class groups fall at levels intermediate to the extremes. They state that the rates of growth were found to be more similar across groups during the school year than during the summer months.

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*Personal communication with the author.

Table 1 presents a set of summary data taken directly from the study. The table presents grade equivalent scores on the MAT Reading Test for 1965-66. Each row gives the following information: the school social class group (where I is low and VI is high), the group mean at the beginning of second grade, the mean growth of the group over five school years, the mean growth over four summers, and the mean group score at the end of sixth grade.

Table 2 presents the three most extreme comparisons from the data in Table 1. These are comparisons between groups I and VI, groups I and V, and groups II and VI. The first column gives the difference between the group means at the beginning of second grade, and the second column gives the difference between the groups at the end of sixth grade. The third column gives the increase in the gap between the groups (column 2 minus column 1). The fourth and

Table 1: School Year and Summer Growth* in Grade Equivalents for Reading Achievement** in New York City Elementary Schools, 1965-66, by Social Class Level of School (Hayes and Grether, p. 5)

Social Class Level of School (I = lowest)	Initial Test Grade 2	Five School Years 35 Months	Four Summers 20 Months	Final Test Grade 6	Number of Schools
I	1.66	3.67	.15	5.48	101
II	1.68	3.54	.47	5.69	74
III	1.86	3.75	.78	6.39	95
IV	2.18	4.20	.78	7.16	63
V	2.46	4.22	1.15	7.83	80
VI	2.42	4.85	.94	8.21	191

*Treating five cross-sectional samples as if they were longitudinal.

**Metropolitan Achievement Tests.

Table 2: A Comparison of Extreme Groups on School Year and Summer Growth in Grade Equivalents in the Hayes and Grether Study with Data from Table 1

Pairs of Groups being Compared (I = lowest social class; VI = highest)	Initial Difference	Final Difference	Increase in Gap	School Component	Summer Component	School* %	Summer* %
I and VI	.76	2.73	1.97	1.18	.79	60%	40%
I and V	.80	2.35	1.55	.55	1.00	36%	64%
II and VI	.74	2.52	1.78	1.31	.47	74%	26%

*The expected increase in gap over the school years is 64 percent (35 of 55 months) and the expected increase over the summers is 36 percent (20 of 55 months).

fifth columns divide this difference into two components: that which occurred over the five school years and that which occurred over four summers. The last two columns translate columns 4 and 5 into percentages of the total change in difference (column 3).

The total time over which the increase in gap occurred was 55 months, of which 64 percent was spent in school (35 months) and 36 percent was spent in summer (20 months). The last two columns in Table 2 show how the actual increase in gap was distributed over the school years and summers. The comparison between group I and group VI--the lowest and highest on social class--is divided in the same proportion as the time indicating that the increase in gap over time in school is the same as over time out of school. Group I compared to group V, however, shows what the hypothesis suggests: that almost twice as much of the increase in the gap has occurred over the summers, which is only 36 percent of the time. But groups II and VI go in the opposite direction. The bulk of the increase (75 percent) has occurred during the school years (64 percent of the time).

These findings are not impressive, but they are suggestive. The authors discuss a number of possible irregularities in the data as well as the assumptions made to treat cross-sectional data as if they were longitudinal. Additionally the authors were limited by having access only to school means in grade equivalents. The use of grade equivalents, particularly across different test batteries, can be misleading (see Angoff, 1971, and Coleman and Karweit, 1972). The measures of social class were very gross: racial composition of the school and number of students eligible for free lunch. Finally there is no information on summer school attendance and each summer includes approximately two months of the school year.

The study done by Shapiro et al. in 1968-69 was designed to replicate the Hayes and Grether study with a group of children in second, fourth and sixth grades in Cobb County, Georgia. The groups were tested in fall 1968, spring 1969, and fall 1968 with batteries of the Stanford Achievement Test. The data were analyzed both cross-sectionally and longitudinally to test the hypothesis that all groups gain similarly during the school year while the poor children gain less over the summer months. The results of the two types of analysis were somewhat similar and the conclusions supportive of the Hayes and Grether study according to the authors. They conclude, as did Hayes and Grether, that growth is less over the summer months for poor children than for rich. They found a greater difference in growth during the school year between low and high social class groups than did Hayes and Grether.

Table 3 presents one set of data for this study: grade equivalent means on Verbal Achievement in fall 1968, spring 1969, and fall 1969 for three grade levels by low and high social class level of school. In this study both the school year and summer intervals are six months longs. The second grade sample shows the same difference between low and high social class in fall 1969 as in fall 1968; however, the school year gain is relatively greater (and summer gain less) for the low group. The fourth grade sample shows an increase in gap between the two groups of .8. Half of this gap occurs over the school year and half over the summer. The sixth grade sample has an increase in gap of .4, all of which occurs during the school year.

These figures are not very convincing, and the study suffers from several problems which raise questions about the usefulness of the data. First is the small size of the sample--only three schools in each group (and only one in the "high" group for the second grade sample). Second, the summer interval is six months long. Third, all reported scores are in grade equivalents. Finally, there were no measures of individual child characteristics to relate to the test results.

Table 3: Grade Equivalent Means on Verbal Achievement* for Three Grades in Cobb County, Georgia, 1968-69, by Social Class Level of School (from Shapiro *et al.*)

Social Class Level of School	Number of Schools	Grade Level 2			Grade Level 4			Grade Level 6		
		fall	sp	fall	fall	sp	fall	fall	sp	fall
Low	3	2.0	2.8	3.1	3.8	4.4	4.7	5.1	5.8	6.2
High	3**	2.4	3.0	3.5	4.3	5.3	6.0	6.5	7.6	8.0

*Stanford Achievement Test.

**The figures for the second grade sample are based on only one of the three schools.

In spite of their limitations, both the Hayes and Grether and the Shapiro et al. studies provide some support for the hypothesis that a disproportionate amount of the gap between rich and poor children occurs over the summer months. Thus it may be true that schools in some way act as an equalizing force, or at least more of an equalizing force than other experiences. If this is the case at all, a reasonable question is whether additional schooling for poor children in the form of summer school continues to have an equalizing impact between poor and non-poor children. This involves an assessment of both the short and long term impact of a summer program.

Outline of Thesis Research

The ideal study of these issues would be an experiment which involved random assignment of children, perhaps blocked on social class, to school and no school. Obviously this is impossible in the context of regular schooling. The best compromise would be to have a similar experiment with random assignment to school during the summer. Because of the limitations of the Follow Through data, further compromises have been made resulting in two separate studies.

The first study is non-experimental. It involves a sample of approximately 1,000 children in Philadelphia Follow Through and comparison schools to see if the gap between poor and non-poor students increases more during the summer than during the school year (assuming the summer to be a period without school). This study is presented in Chapters II-VII.

The second study is an experiment with children randomly assigned to summer program participation. It involves four Follow Through summer projects to test the hypothesis that a summer program increases achievement growth and that this increase is maintained throughout the following school year. This study falls short of ideal in that there is little social class variation. This study is presented in Chapter VIII. Chapter IX summarizes the studies and provides recommendations for future work.

CHAPTER II

PHILADELPHIA SAMPLE

Overview

The Philadelphia study is concerned with growth in achievement over the summer and its relationship to home background characteristics. The major hypothesis can be stated in the following way:

> The difference between the monthly gains of poor and non-poor children is larger during the summer than during the school year.

In order to test this hypothesis it is necessary to have a minimum of three achievement tests and a source for home background information. Since the National Follow Through Evaluation involved testing in Philadelphia in the spring of 1972, the fall of 1972, and the spring of 1973, this site was selected as the sample for this part of the study. This section will describe how the sample was selected, the measures used and the characteristics of the sample.

Sample Selection

The original design for this research ([illegible] David, 1973) involved an extended list of complex hypotheses, some of which related type of school year program to achievement growth. Some of these hypotheses have proved untestable because of limitations of the data but still served as the motivation for the initial sample selection criteria. Since instructional programs were of interest, it was decided to represent extremes on a continuum of classroom structure and as a result three Follow Through models were chosen: Bank Street College of Education (Bank Street), the Support and Development Center for Follow Through, University of Kansas (Kansas), and Educational Development Corporation (EDC).* Additionally, a comparison (non-Follow Through) group was included for each of the models. Although comparison children in the National Evaluation of Follow Through were selected in order to provide a sample similar to the Follow Through sample, it was often the case that the comparison group was on the average higher than the Follow Through sample on background measures. Thus these groups were included in the hope of extending the range of background characteristics as well as providing a sample of traditional instructional approaches.

Additionally, since the effect might depend upon age, three grade levels were included. Anticipating some attrition between initial and final testing, the aim was to test 100 Follow Through children in each model at each of the three grade levels and fifty non-Follow Through children corresponding to each of the three models at each grade. This choice was to insure that the final sample would be close to eighty Follow Through children per cell and forty non-Follow Through children in each model. While there was no attempt to randomly select children within each cell, there was an attempt to select children from more than one school in each model so that no project would be represented by only one school.

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*See Appendix F for a description of these models and analyses related to them.

Finally, since a large majority of Follow Through children in Philadelphia are black, it was decided to include only black children in the sample.

The final sample of children with three tests and a parent interview is close to the goal. Table 4 shows by model, Follow Through participation and grade level, the number of children with three achievement tests and a parent interview.

These numbers reflect the maximum possible sample for inclusion in a given analysis. The actual samples are smaller because the requirements for inclusion are more stringent in most analyses; that is, a child must have valid scores on all the subtests as well as valid responses on the items selected from the parent interview to be included in a specific analysis. The final analysis sample

Table 4: Number of Children in Philadelphia Sample with Three Achievement Tests and A Parent Interview by Grade, Model and Follow Through (FT)/Non-Follow Through (NFT)

Model	FT/NFT	GRADE K	 1	 2
Bank Street	FT	101	77	87
	NFT	37	48	43
Kansas	FT	81	85	87
	NFT	32	42	33
EDC	FT	82	81	91
	NFT	42	44	50
Total by Grade		375	377	391

for most of the analysis consisted of approximately 250 kindergarten children, 300 first grade children, and 275 second grade children.

Measures

The two main instruments used in the study were the Metropolitan Achievement Tests (DuPost et al., 1971) and the National Opinion Research Center-administered Follow Through Parent Interview (1972). The youngest children in the sample took the Primer Battery of the MAT in the spring of 1972 and the fall of 1972 and took the Primary I Battery in the spring of 1973 (at the end of first grade). The next group of children who were in the first grade in spring

1972 took the Primary I Battery at this time and again in the fall of 1972. They took the Primary II Battery in the spring of 1973--the end of second grade. The oldest group of children who were in the second grade in the spring of 1972 took the Primary II Battery then and in the fall of 1972. They took the Elementary Battery at the end of the third grade in the spring of 1973.*

In order to assess home background information, one parent of each child (generally the mother) received an individually administered personal interview. The instrument provided two broad types of information. The first consisted of questions about the economic level of the household as judged by items such as mother's education, household income, and mother's occupation. The second type consisted of information descriptive of the home environment from items such as how often the child is read to, how often the child reads out loud or watches Sesame Street or Electric Company. Additionally there were two questions on the interview which attempted to document some of the child's activities over the summer.**

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*The content of the subtests of each battery is described in Appendix A.

**These variables are described in Appendices A, C, D, and E.

Sample Characteristics

Table 5 presents figures by grade level for four background variables: income, mother's education, mother's occupation, and head of household. This table shows that the distributions are quite similar across grade levels, which one would expect given that the samples were drawn from the same schools at the same time. The distributions also demonstrate that, on the whole, the samples are quite poor. The median family income is approximately $5,000. The average mother's education is between ten and eleven years of school. Half of the employed mothers are service workers and almost all the rest are operatives or clerical workers. In approximately half the households the mother is the head of the household and the father is the head in about one-third of the households.

Table 6 presents three sets of comparisons between this sample and corresponding national figures. These comparisons may be somewhat misleading since the groups and variables are not exactly comparable. The sample in this study is all in a large northern metropolitan area. Females in the national sample are not necessarily mothers. Also, the categories of the variables are not the same. For all three variables, the categories for this sample were broader. Finally, the variables have different standard deviations.

Table 5: Philadelphia Sample Described by Four Background Variables by Grade Level

	GRADE					
	K	(n)	1	(n)	2	(n)
Income in Thousands		(252)		(290)		(271)
Mean	5.7		5.8		5.9	
Median	4.9		5.1		5.1	
SD	3.4		3.4		3.3	
Mother's Education in Years		(241)		(283)		(276)
Mean	10.6		10.7		10.7	
Median	10.0		10.0		10.0	
SD	1.7		1.9		1.8	
Mother's Occupation		(212)		(259)		(238)
% Service	48.4		44.9		50.0	
% Operative	26.8		27.2		26.3	
% Clerical	18.9		22.4		17.6	
% Other	5.9		5.5		6.1	
Household Head		(268)		(304)		(293)
% Mother	44.2		51.2		53.5	
% Father	36.5		33.0		33.2	
% Other	19.3		15.8		13.3	

Table 6: Comparison of Philadelphia Sample and National Census Figures* on Mother's Education, Income, and Mother's Occupation

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	PHILADELPHIA SAMPLE	NATIONAL FIGURES	
Median Year's Education	Mothers	Females (21 years and over)	Black Females (21 years and over)
	10.0	12.2	10.7
Median Family Income	Households	All Families	Black Families
	$5,100	$ 9,870	$ 6,280
Occupation (% in each)	Mothers	Females	Black Females
Professional	1.0	15.7	11.4
Farm manager	.1	.3	.2
Proprietor	1.0	3.7	1.4
Clerical	19.7	34.9	20.7
Sales	1.3	7.4	2.6
Crafts	2.3	1.8	1.4
Operative	26.8	14.3	16.4
Service	47.7	20.4	43.4
Farm Laborer	.2	.6	1.1
Laborer	0	1.0	1.5
Total % Employed	86.7	39.2	43.7

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*Current Population Reports, Bureau of the Census: "Income in 1970 of Families and Persons in the United States" and "Educational Attainment: March 1971."

Nevertheless, it seems clear that the sample in this study is considerably below the national sample on these measures and even lower than the national sample of blacks. The implications of this restricted range are discussed under "Sample Characteristics" in Chapter III.

CHAPTER III

ANALYTIC ISSUES

The choice of an appropriate analysis strategy is not obvious given the type of data collected in this study. While these data represent an improvement over data previously collected for similar work, there are three major weaknesses which affect conclusions from any analysis. The three problems involve the summer interval, the sample characteristics and the characteristics of the achievement tests. This section discusses each of these problems and presents an overview of the analysis strategies employed.

Time Interval

Since the intent of the study is to assess learning over the summer and over the school year, it is essential to have a minimum of three testings which define a school year and summer. Because the testing in a large metropolitan area required coordination between the Office of Education, the data collector and the school system, it was next to impossible administratively and physically to test during the first and last weeks of the school year.*

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*Additionally, there are arguments against the desirability of testing close to the beginning and end of the year that claim school is unusually disrupted during those periods and thus it is not a good time to get a reliable measure of student achievement.

Nonetheless, throughout the Follow Through evaluation there has been an attempt to test as close to the beginning and end of the school year as possible. Generally, this has resulted in testing periods between three and six weeks into the school year and six to three weeks before the end of the school year. In large city school systems such as Philadelphia, the interval may be a little longer. Unfortunately, this problem was further complicated by the fact that the 1972-73 school year in Philadelphia was disrupted by two teacher strikes--the first of which delayed the opening of school approximately two weeks and the second of which delayed the reopening of school after the Christmas vacation an additional seven weeks. Although attendance records for the schools involved in the study show that attendance during the seven week strike was not substantially reduced, there is no documentation as to how much school differed from normalcy during those weeks.*

The mean date of spring 1972 testing was May 3. For fall 1972 testing the mean date was November 10 and for spring 1973 testing the mean date was May 23. Consequently, the defined summer interval spans about twelve weeks of school and the school year interval includes usual vacation time and seven weeks of strike. The following calculations illustrate in part how severe the problem may be with these data.

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*The average daily attendance rates for the Follow Through schools in the study averaged 71 percent based on a sample of attendance during seventeen strike days. The ADA for the comparison schools in the sample based on a sample of thirteen days was 66 percent. This compares to an estimated non-strike ADA of 80 percent.

In this study, the summer interval of six months includes approximately three months of school and the school year includes an approximately two-month-long teacher strike. If Y represents the effects of a month of school and S represents a month of summer, the difference in growth per month for the two periods (assuming still six months each) should be $\frac{6Y}{6} - \frac{6S}{6}$ or Y - S. In this study the monthly rate during the summer is $\frac{3Y + 3S}{6}$, reflecting the three months of school in the summer interval. If the strike of two months is considered to be non-school, the monthly rate during the school year is $\frac{4Y + 2S}{6}$. The difference between school year and summer growth is then $\frac{Y - S}{6}$ or one-sixth of the original estimate. If the strike period is considered to be school, the monthly rate over the school year remains $\frac{6Y}{6}$ and the difference between school year and summer growth is $\frac{Y - S}{2}$. Thus even the most liberal interpretation reduces the estimate of the growth difference to one-half of the original estimate.

An additional problem stems from lack of reliable information on the summer experiences of the children. The parent interview asked whether or not the child had attended summer school. Approximately one-fourth of the kindergarten and first grade samples and one-eighth of the second grade sample had responses of "yes." But the question also asked what type of summer program was attended in order to be able to distinguish instructional from non-instructional experiences.* Only about one-fifth of the parents even responded to this part of the question, making it impossible to determine with any accuracy the actual summer experiences of the children. Consequently, summer school attendance was not entered into the analysis.**

Sample Characteristics

The second major problem with these data stems from the characteristics of the sample. Since the major hypothesis involves relationships between achievement growth and social class, it is desirable to have social class measures with sufficient ranges and variances to detect differences along the continuum. Because the data come from the Follow Through evaluation, the measures of social class such as mother's education and income are both limited in variance and truncated at the top. The target population of the Follow Through program is children of families below the poverty level and thus not representative of the full range of social classes. The degree to which some of these measures are restricted relative to the national population is shown in Table 6, page 31.

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*The choices were: reading, library, tutoring, arts and crafts, sports, music and other. These were elaborated upon in the interview.

**I inspected the correlations between summer school attendance (no/yes) and each subtest at each test point for all three samples. None of these correlations was significant.

Characteristics of Achievement Tests

The third problem involves the type of instrument used for an assessment of achievement growth. Because using the MAT involves administering a different battery each year, one battery is used in spring 1972 and fall 1972 and another in spring 1973. Consequently, it is impossible to assess growth by looking at total raw score changes or by more complex analyses which involve looking at particular items or subsets of items. The scores must be transformed in some way in order to permit comparisons between estimates of school year growth and summer growth. This means that there is no way to talk about absolute growth rates.

The basic choices for transforming the scores are among the publisher's standard scores, percentiles, or grade equivalents, and some other standardization procedure (such as standardizing on the sample in the study). Since the purpose in transforming the scores in this study is to permit comparisons from one battery to the next, the decision was made to standardize the scores using the sample in the study.* This was done for each subtest at each time point by subtracting the mean and dividing by the standard deviation for the sample tested at that point in time. This approach is not entirely satisfactory since the difference between two standardized scores is not easily interpretable. A change from spring to fall can only be interpreted in terms of a child's shift in relative position. Interpretation becomes even more difficult when comparing two sets of gains. But given that it is impossible to determine an absolute change with different tests, this standardization seems as appropriate as any.**

Since it is difficult to argue for the unique appropriateness of any particular analysis strategy, this thesis presents the results from three approaches. The first relates the difference in school year growth and summer growth to various background measures. The second compares the differences in scores between poor and nonpoor groups at each test point. The third compares the coefficients of background measures in pairs of regression equations predicting end of summer and end of school year scores. The next three chapters present descriptions of the three analyses of the Philadelphia data. These are followed by a section which discusses the strengths and weaknesses of the three approaches and summarizes the findings.

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*See p. 75 and Appendix G for a comparison of results using different metrics. It should also be noted that standardizing scores masks changes in variance. But since the tests change, there is no way to make a straightforward comparison of the variances.

**Additionally, there is the issue of what the tests are measuring. It is assumed that the tests do measure some sort of learning--and it is assumed that what is being measured is something influenced by schools. If this is not the case, then the measures are not appropriate.

CHAPTER IV

PHILADELPHIA ANALYSIS 1

Description of Two-Part Analysis

The first analysis began with defining a dependent variable which was a direct translation of the hypothesis. This variable is the average school year rate of growth per month minus the average summer rate of growth per month--where the average growth is the difference of two standardized scores divided by the number of months in the time period.* This variable is called Growth Difference. Ignoring measurement error and the problem of depending on transformed scores, Growth Difference is a reasonable combination of the three test points.** The hypothesis suggests that the poorer the child, the greater this difference should be; that is, the greater the relative loss over the summer. Thus it makes sense to look at the relationship between this variable and appropriate background measures with the expectation that the relationship will be negative.

The analysis using Growth Difference was done in two ways. The first produced a series of scatterplots of the test variables with income and with a composite home educational environment measure. Also for each, the correlation, its statistical significance, the intercept and slope of the least squares line were calculated. The second way was to calculate the dependent variable for various subgroups defined by levels of several background measures. In both presentations, Growth Difference was calculated for the same sets of subtests from the Metropolitan Achievement Tests (Durost _et al_., 1970). After describing the tests used,* the two parts of the analysis are presented. This is followed by a brief summary of both.

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*Since the two time periods in this study are each six months, this division was unnecessary.

**A rough estimate of the reliability of this variable is .7. This rough estimate was based on the Total Reading Scores for the first grade sample.

The rationale for selecting and combining the subtests was somewhat subjective. For each grade level, the Spring 1972 and Fall 1972 test are one battery and the Spring 1973 test is the next higher battery. For certain subjects, the two batteries for a group have the same subtest name. For the kindergarten group, there is no direct name correspondence but on inspection it made sense to match each of the Primer subtests to the Primary I battery as shown below.

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*The content of each subtest in the four batteries is described in Appendix H.

Primer (S72 & F72)	Primary I (S73)
Reading	Total Reading*
Sounds	Word Analysis
Numbers	Math

For the first grade sample, again three matches were made as shown below:

Primary I (S72 & F72)	Primary II (S73)
Word Analysis	Word Analysis
Total Reading	Total Reading
Math	Total Math

The total math score in the Primary II is the sum of three math subtests: Computation, Concepts and Problem Solving.

For the third grade, all subtests match across the Primary II and Elementary battery with the exceptions of Word Analysis which doesn't appear in the Elementary and Language which doesn't appear in the Primary II. Below is a list of the subtests which includes the Total Math score rather than the three subtests from which it is formed and Total Reading rather than Reading and Word Knowledge.

Primary II (S72 & F72)	Elementary (S73)
Total Reading	Total Reading
Spelling	Spelling
Total Math	Total Math

---

*In all batteries above the Primer, the Total Reading Score is the sum of two subtest scores: Word Knowledge and Reading.

Scatterplot Analysis Description

For this part of the analysis, the three dependent variables were calculated for each grade level: (S73-F72)-(F72-S72) where each time represents a test score standardized on the entire sample tested at that time. Each dependent variable (Growth Difference) was then plotted against two variables: first, a measure of social background and second, a measure of home educational environment.

The social background measure was the logarithm of income. Income was chosen because it presented more variation relative to the national sample than other indices such as mother's education or occupation. The log was taken as is commonly done with income so that a given percent increase in income reflects the same effect for all income values.

The home educational environment measure is included as a rough indicator of experiences in a child's home which may reflect opportunities to learn more directly than social class or status measures. Unfortunately, there is little variance on any of the individual measures. To form one composite measure, the responses to the items considered to reflect the home environment were summed.* Because this measure was calculated only for subtests with valid responses on every item included, the sample sizes are considerably smaller here than for the analysis with income.*

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*The variables included in the composite, their scoring and their means and standard deviations are presented in Appendix A. It should be noted that summing the variables weights them by their variance.

Results by Grade

Table 7 presents a summary of results for the scatterplot analysis. For each grade level, the table gives as column headings the pair of tests used for each Growth Difference variable. The entries in the table are the correlations between Growth Difference and (a) log income and (b) home educational environment. These relationships are presented in the corresponding scatterplots which follow Table 7 (Figures 1-7). For simplicity, only those scatterplots for which the relationship is statistically significant ($p < .10$) are included here. The remaining scatterplots can be found in Appendix B. On each scatterplot the least squares regression line is drawn.

The hypothesis is that the lower a child is on a given background measure, the less he is expected to gain over the summer relative to the school year. In other words, a high value on Growth Difference should be associated with a low value on the background measure. Hence, the expectation is that all the correlations between Growth Difference

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*It's interesting to note that the number of cases excluded decreases considerably with age.

Table 7: Correlations between Growth Difference (School Year Growth Minus Summer Growth) and (a) Log Income and (b) an Index of Home Educational Environment (HEE)

Kindergarten

	n	Reading & Total Reading	Sounds & Word Analysis	Numbers & Math
Log Income	252	.14***	.00	.03
HEE	157	-.11*	.02	-.01

First Grade

	n	Word Analysis & Word Analysis	Total Reading & Total Reading	Math & Total Math
Log Income	294	-.14***	-.16***	-.16***
HEE	218	-.09*	.02	-.03

Second Grade

	n	Total Reading & Total Reading	Spelling & Spelling	Total Math & Total Math
Log Income	273	-.06	-.12**	-.04
HEE	222	.01	.00	-.02

* $p < .10$
** $p < .05$
*** $p < .01$

FIGURE 1

SCATTERPLOT OF READING GROWTH DIFFERENCE AND INCOME: KINDERGARTEN (N = 252)

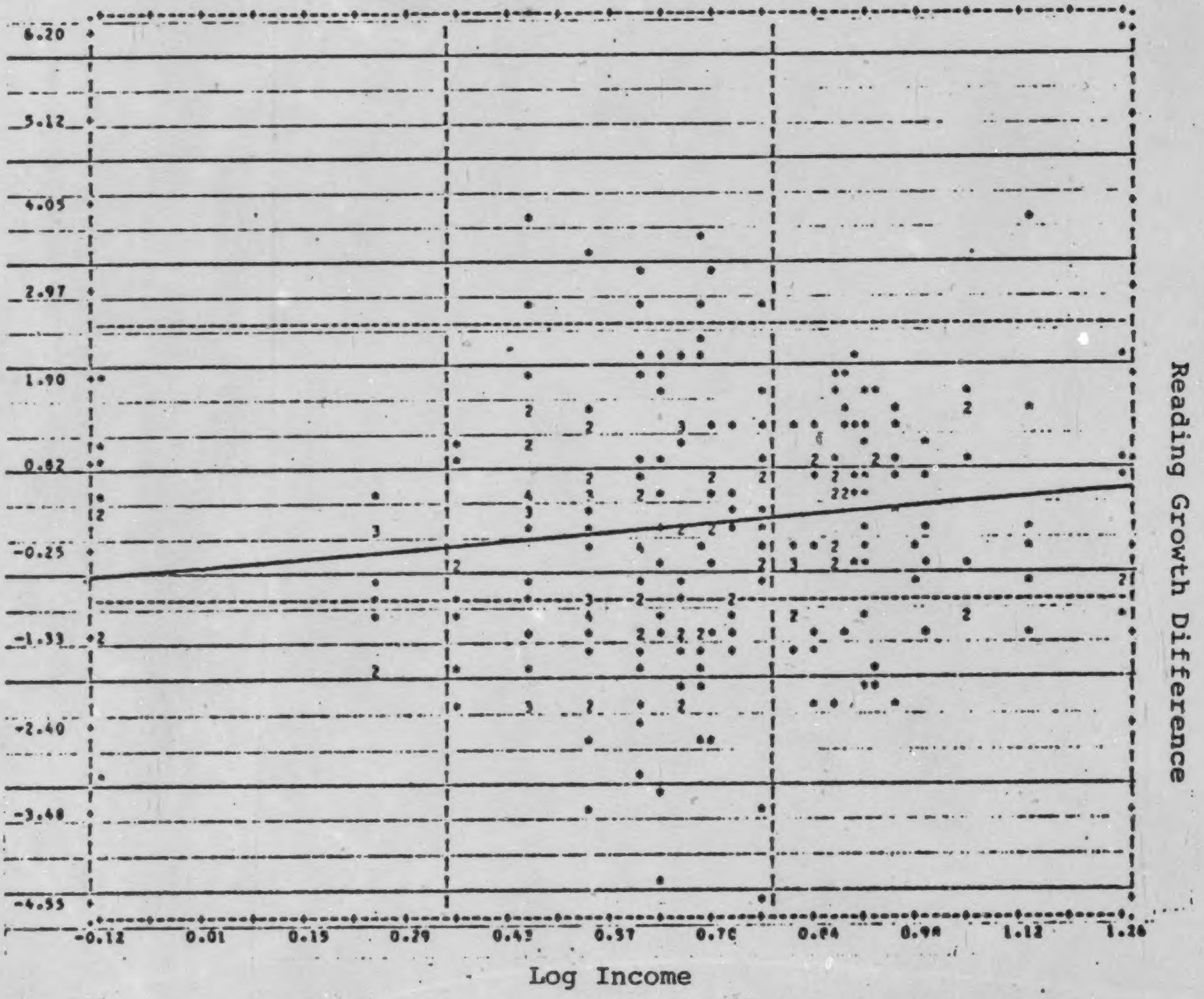


FIGURE 2

SCATTERPLOT OF READING GROWTH DIFFERENCE AND HOME EDUCATIONAL ENVIRONMENT: KINDERGARTEN (N = 157)

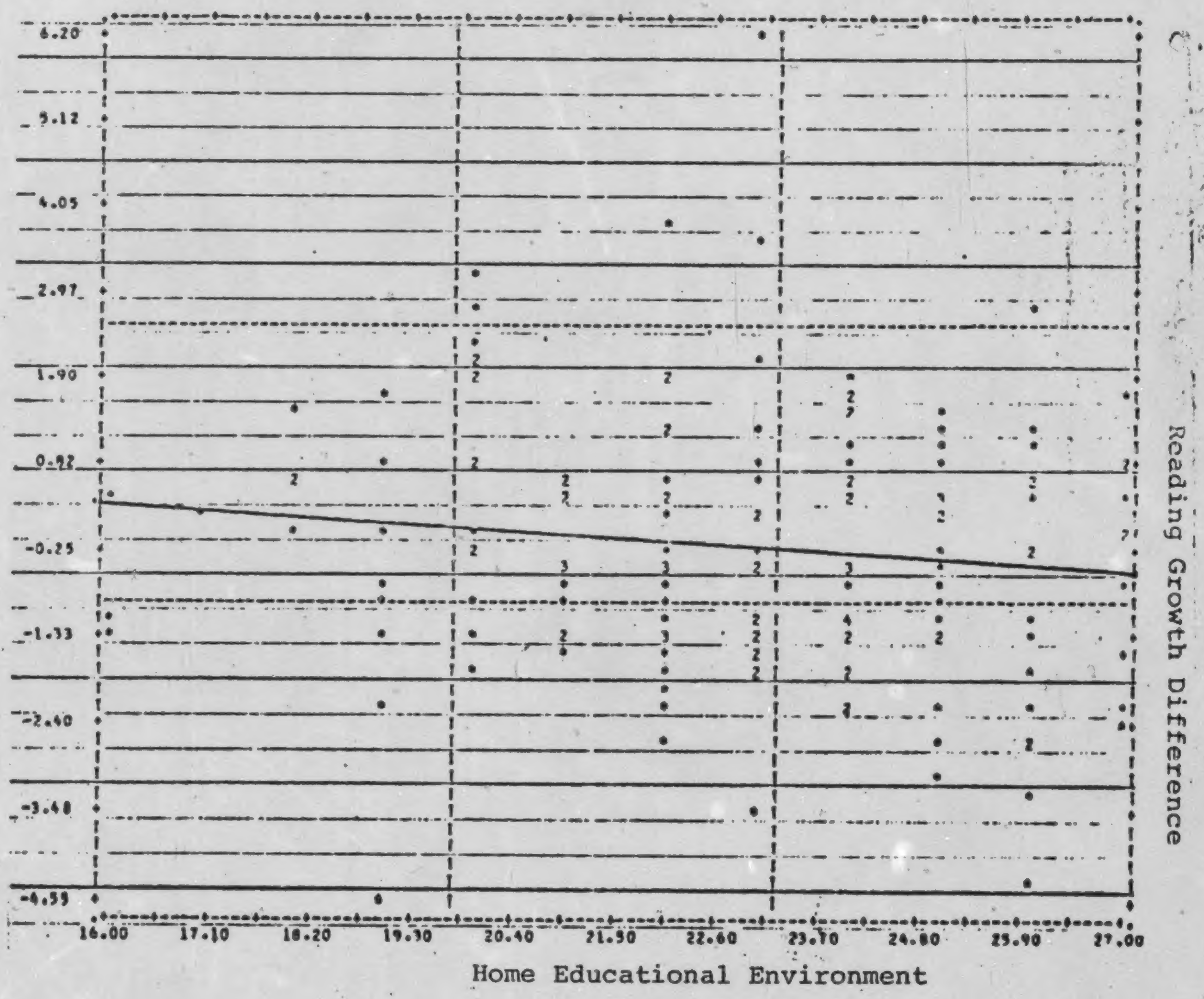


FIGURE 3

SCATTERPLOT OF WORD ANALYSIS GROWTH DIFFERENCE AND INCOME: FIRST GRADE (N = 294)

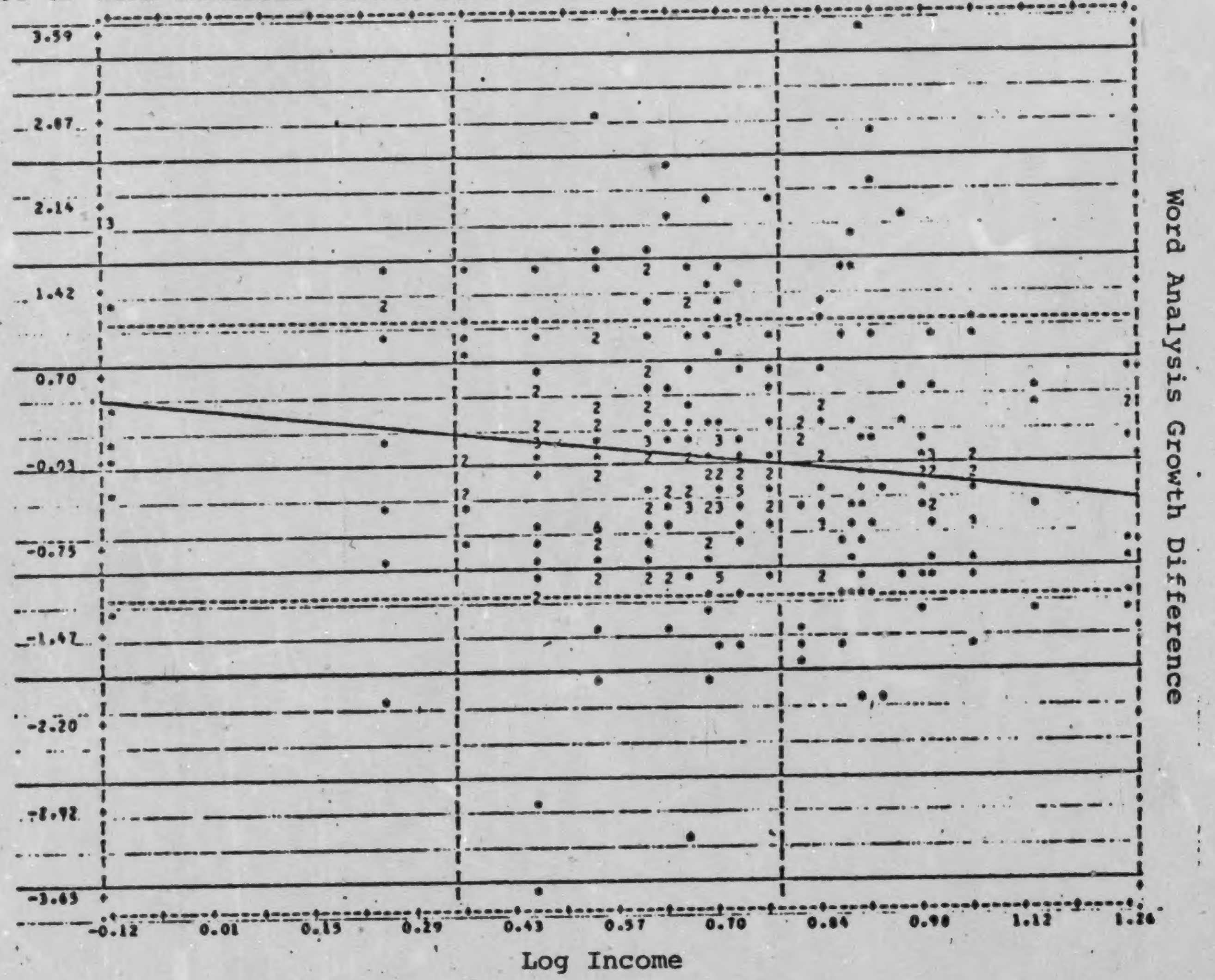


FIGURE 4

SCATTERPLOT OF WORD ANALYSIS GROWTH DIFFERENCE AND HOME EDUCATIONAL ENVIRONMENT: FIRST GRADE (N = 218)

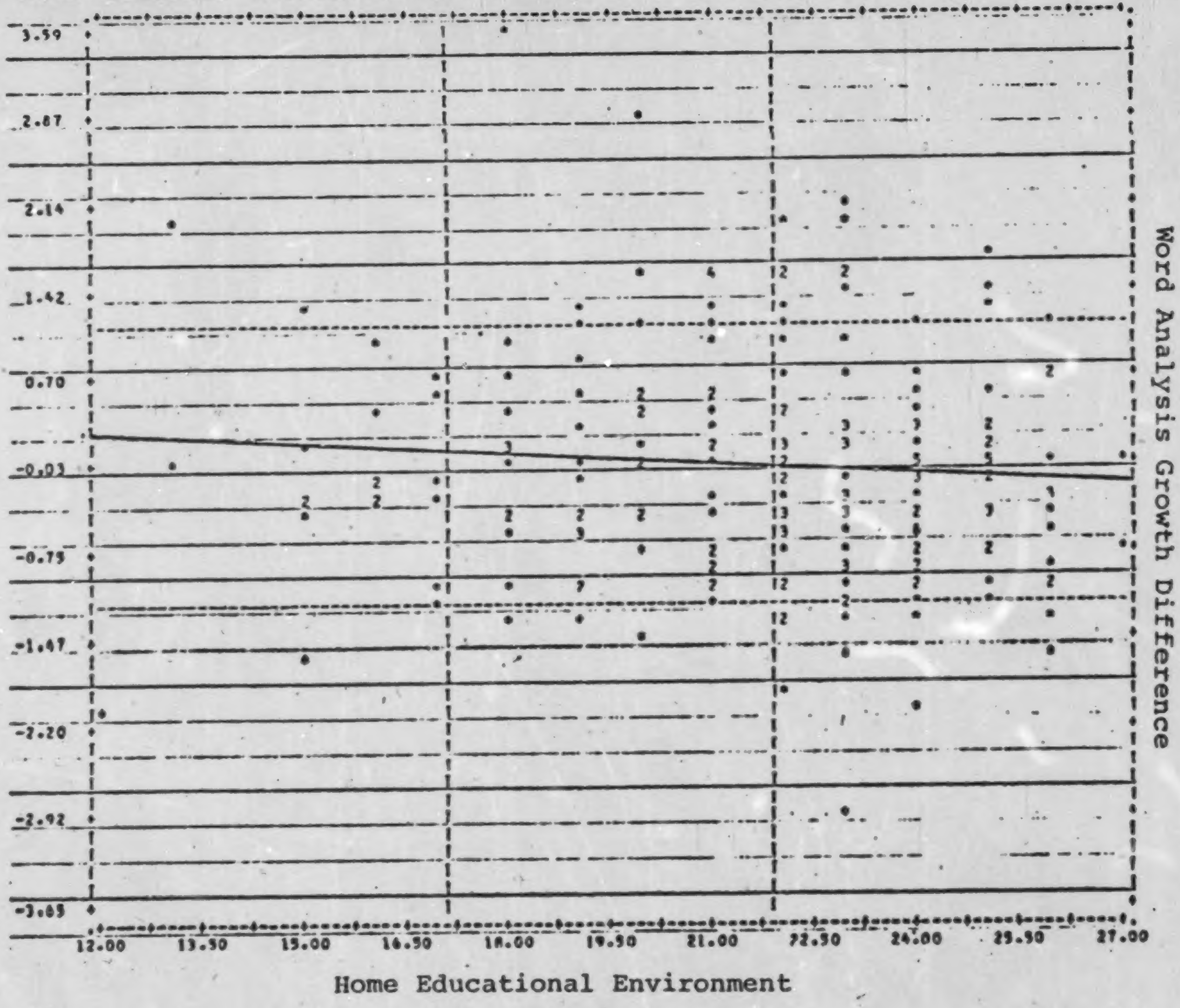


FIGURE 5

SCATTERPLOT OF READING GROWTH DIFFERENCE AND INCOME: FIRST GRADE (N = 296)

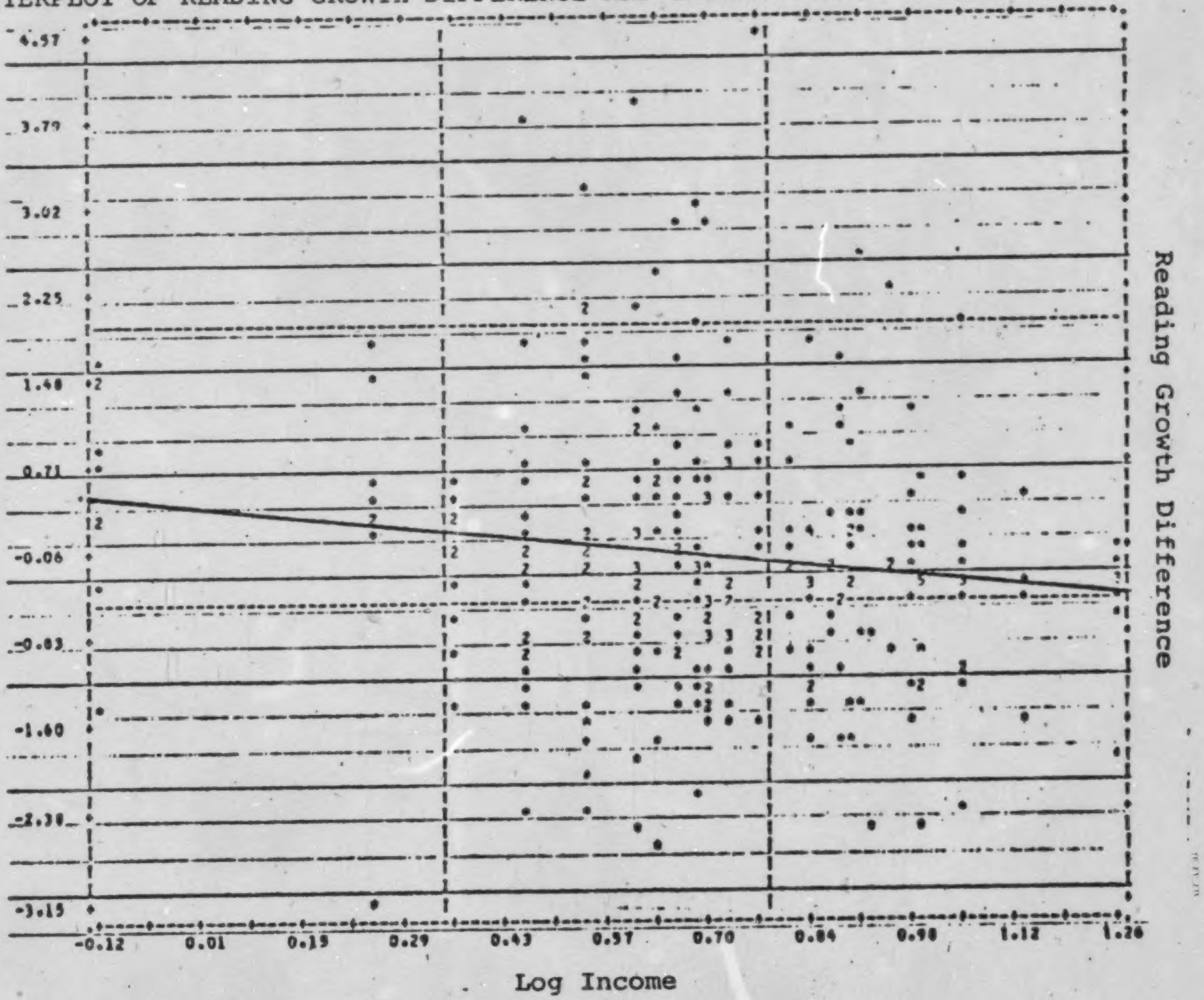


FIGURE 6

SCATTERPLOT OF MATH GROWTH DIFFERENCE AND INCOME: FIRST GRADE (N = 296)

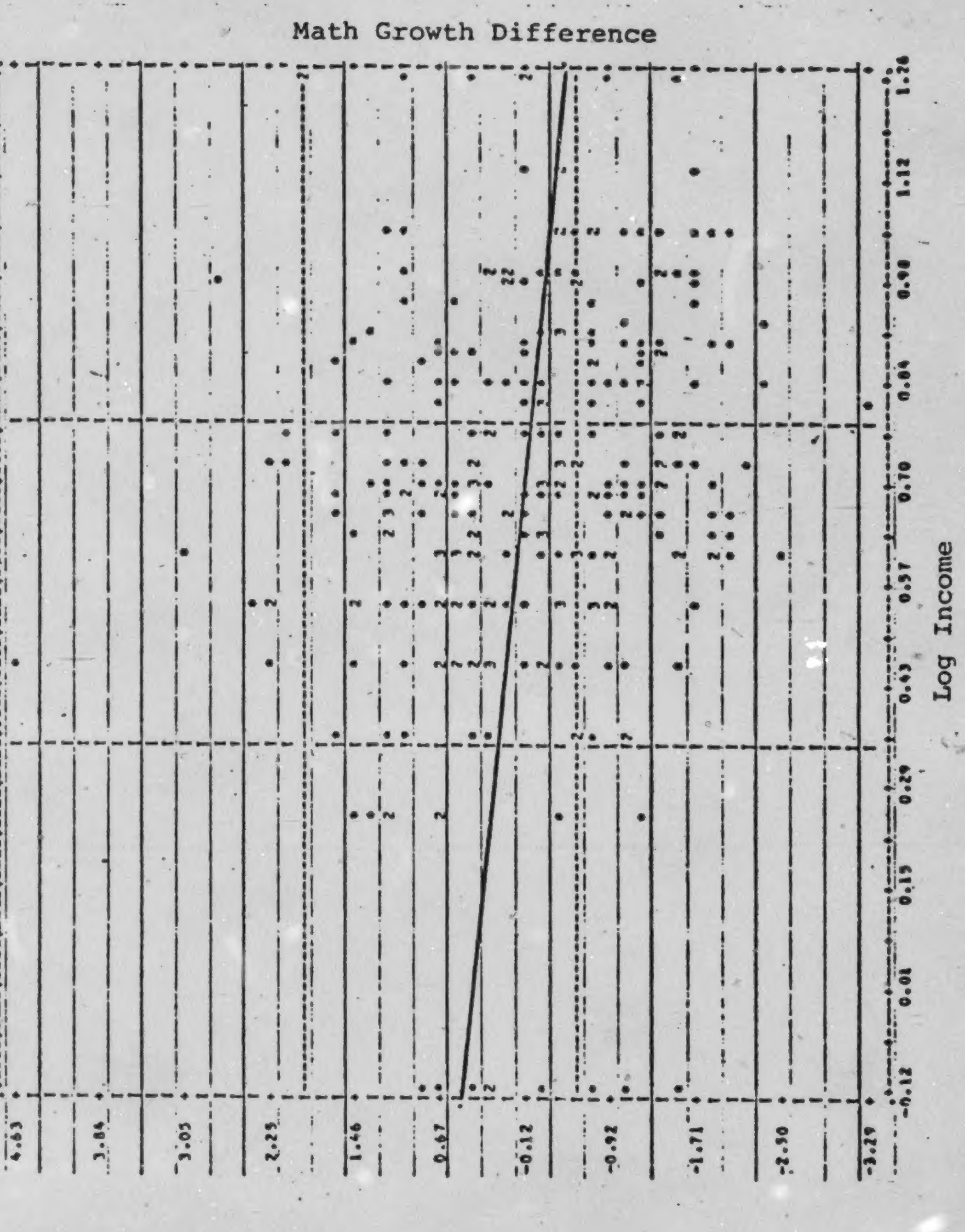
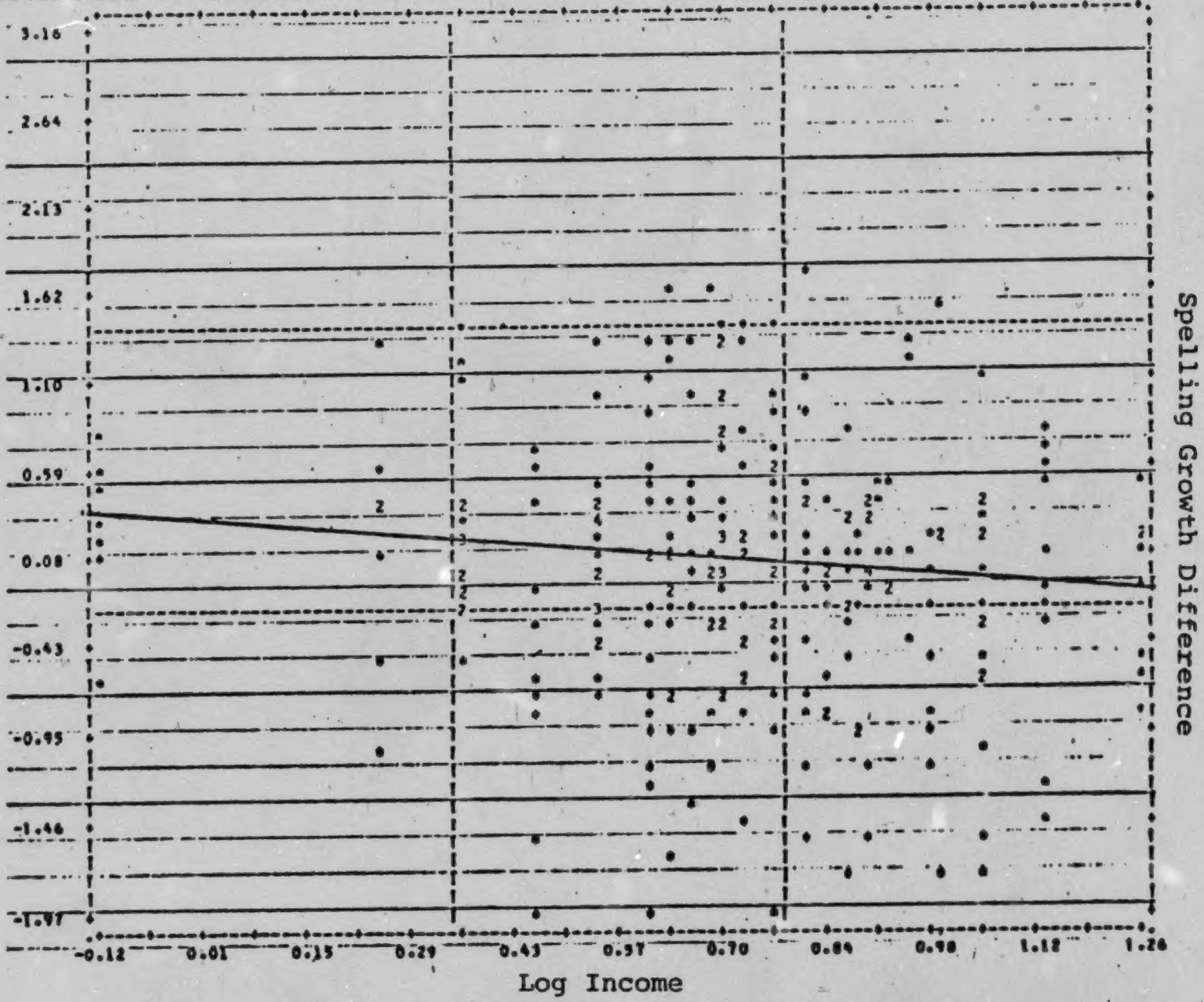


FIGURE 7

SCATTERPLOT OF SPELLING GROWTH DIFFERENCE AND INCOME: SECOND GRADE (N = 273)



and income should be negative. Although statistical significance is used as one criterion of importance, it should not be the only one. First of all, the problems with the data discussed previously would indicate that all relationships will be attenuated. This is why the liberal p-value of .10 is used. Secondly, a correlation coefficient alone can be very misleading since it is quite sensitive to even one outlying value. It is for this reason in particular that the scatterplots are included so that the reader can estimate by inspection how much of the correlation (or lack of a significant correlation) is due to a few extreme values. The results are discussed below by grade level.

Kindergarten

From Table 7 it can be seen that only one of the six correlations is significant ($p < .10$) and in the expected direction (Reading and home educational environment). The scatterplot seems to confirm a weak relationship in the expected direction. Of the remaining five correlations, all but one of which are positive (not the expected direction), one is highly significant. But inspection of the scatterplot suggests that the one or two values in the upper right quadrant may account for this one because the bulk of the values suggests virtually no relationship. The four correlations which indicate no relationship at all appear to be supported by the scatterplots. (See Appendix B)

First Grade

Five of the six correlations for this sample go in the expected direction. All three involving income are highly significant and the one between Word Analysis and home educational environment is barely significant. While none of the three correlations with income is strong, the scatterplots do seem to indicate a negative relationship and not one determined only by a few outliers. This is less clear but seems still to be the case for the Word Analysis and home educational environment relationship. The scatterplots for the remaining two correlations with home educational environment suggest no relationship.

Second Grade

Table 7 shows that four of the six correlations are in the expected direction but three of the four (as well as the remaining two) are probably not detectably different from zero. The one significant relationship is between Spelling and income. The corresponding scatterplots seem to support these correlations, although the one significant relationship does not present a very convincing picture.

Subgroup Analysis Description

For the second part of this analysis, the same Growth Difference variables were used for each grade level. Instead of calculating correlations as before, the Growth

Difference variables were calculated separately for two subgroups of a number of background measures. The expectation here is that the value of Growth Difference will be greater (reflecting greater relative change over the school year) for the group lower on the background measure. For example, children whose mothers did not complete high school would be expected to reflect a greater impact of school relative to summer than children whose mothers completed high school. Tables 8, 9, and 10 present these values for each grade level, respectively. The column headings give the sample size and the test names for each grade. The rows represent eight background measures, the first three of which can be considered indices of social class and the other five of home educational environment.* The variables are defined briefly below. A more detailed description of them is in Appendix C.

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*It was argued in the beginning of this report that social class measures are treated as proxies for aspects of a child's home environment more directly related to educational opportunities and achievement. Although the home educational environment variables were designed to be of the latter type, there are problems in interpreting them as such. The first evidence for that lies in the low category for questions such as, "Do you read out loud to your child?" For kindergarten only 5 percent fall in the "no" category and 6 percent for first grade. It seems possible that these questions carry such an obvious stigma that they are not answered as frankly as questions such as whether the home is owned or rented.

Table 8: Kindergarten Growth Difference Scores for High and Low Groups on Eight Background Measures for Three Sets of Tests (A = Low, B = High)

			TESTS		
Background Variables		n	Sounds/ Word Analysis	Reading	Numbers/ Math
Mothers	A. < H.S.*	128	-.138	.090	-.147
Education	B. > H.S.**	113	.058	.030	-.137
Head of	A. Mom	115	-.020	.059	-.252
Household	B. Pop	99	-.016	.132	.031
Home	A. Rented	179	-.100	-.006	-.182
	B. Owned	88	-.007	-.030	-.229
Have	A. No	44	.441	.281	-.193
Books	B. Yes	194	-.216	-.074	-.232
Reads	A. No	45	.088	.347	-.412
Out Loud	B. Yes	184	-.130	-.063	-.155
Is Read	A. No	14	.574	-.207	-.423
To	B. Yes	254	-.093	.000	-.179
Watches	A. No	21	.142	-.473	-.215
Sesame St.	B. Yes	245	-.073	.049	-.187
Watches	A. No	87	.156	-.221	-.347
Electric Co.	B. Yes	180	-.163	.099	-.111

*Less than High School.

**More than High School.

Table 9: First Grade Growth Difference Scores for High and Low Groups on Eight Background Measures for Three Sets of Tests (A = Low, B = High)

Background Variables			n	TESTS Word Analysis	Reading	Math
Mothers	A.	< H.S.*	160	-.013	.063	.012
Education	B.	> H.S.**	128	.003	-.311	-.274
Head of	A.	Mom	161	.055	.064	.079
Household	B.	Pop	106	-.040	-.241	-.321
Home	A.	Rented	221	.011	.028	-.009
	B.	Owned	84	.033	-.348	-.276
Have	A.	No	44	.002	.109	.042
Books	B.	Yes	259	.000	-.119	-.114
Reads	A.	No	34	.038	.390	.054
Out Loud	B.	Yes	267	-.004	-.143	-.105
Is Read	A.	No	20	.079	-.124	-.185
To	B.	Yes	290	.004	-.080	-.087
Watches	A.	No	39	.137	-.182	-.012
Sesame St.	B.	Yes	269	-.006	-.068	-.112
Watches Electric	A.	No	105	-.070	-.007	.020
Co.	B.	Yes	201	.057	-.121	-.157

*Less than High School.

**More than High School.

Table 10: Second Grade Growth Difference Scores for High and Low Groups on Eight Background Measures for Three Sets of Tests (A = Low, B = High)

			TESTS		
Background Variables		n	Reading	Spelling	Math
Mothers	A. < H.S.*	143	.150	.174	.029
Education	B. > H.S.**	134	-.068	-.122	-.009
Head of	A. Mom	145	-.004	.080	-.082
Household	B. Pop	116	.029	-.029	.140
Home	A. Rented	200	.076	.043	.051
	B. Owned	93	.013	.028	-.016
Have	A. No	30	.148	.165	.515
Books	B. Yes	262	.055	.015	-.027
Reads	A. No	23	-.049	-.071	.083
Out Loud	B. Yes	269	.075	.039	.025
Is Read	A. No	32	.119	.044	-.037
To	B. Yes	263	.060	.032	.042
Watches	A. No	35	.140	-.043	.069
Sesame St.	B. Yes	259	.059	.042	.031
Watches	A. No	93	.020	.081	.085
Electric Co.	B. Yes	195	.089	-.016	.007

*Less than High School.

**More than High School.

(1) Mother's Education (a) less than high school
(b) high school or more

(2) Head of Household (a) mother (b) father

(3) Home: whether home is (a) rented (b) owned

(4) Have Books: Are there books at home that child on his own other than school books?

(5) Read Out Loud: Does child ever read out loud to someone at home?

(6) Is Read To: Does someone at home ever read to child?

(7) Watches Sesame St.: Does child ever watch Sesame Street when not in school?

(8) Watches Electric Co.: Does child ever watch Electric Company when not in school?

Results by Grade

For this part of the analysis, the expectation is that the score on Growth Difference will be higher for the lower category (less education, reads less, etc.) on each background measure. These results are discussed below by grade level. Of most interest is the direction of the difference; however, to give the reader a feel for the size of the difference, I have included very rough estimates of statistical significance.

The standard deviation for the Growth Difference scores is approximately 1 for the subgroups. The sample sizes for the pairs of subgroups range roughly from 20 and

250 to 150 and 100. Using these sample sizes, the standard errors of the differences are roughly .23 (for 20 and 250) and .13 (for 150 and 100). At the .05 level, the t-test is significant when the difference between the groups is about .46 for the groups very different in size and about .26 for the groups similar in size. These are the figures used for the rough estimates in the results.

Kindergarten

Table 8 presents twenty-four pairs of scores of which eleven show the expected pattern: a higher value for the low background category. Using the rough rule given above for significance, four of the twenty-four pairs reflect significance but only two of these are in the expected direction.

First Grade

In Table 9, eighteen of the twenty-four pairs of values follow the expected pattern. Of these, four reach the criterion of significance, all of which are in the expected direction.

Second Grade

In Table 10, seventeen of the twenty-four comparisons are in the expected direction. Two of these satisfy the significance criterion--both in the expected direction.

Summary of Analysis 1 Results

Overall, the evidence supporting the hypothesis in the kindergarten sample is quite weak. It is also confusing in the differences between the two parts of the analysis. For example, Table 7 suggests that there is a small relationship between Reading and home educational environment. Table 8 indicates that this relationship is stronger for Sounds/Word Analysis in that all five of the educational environment measures go in the expected direction and two are significant.

For the first grade sample, the evidence tends consistently to support the hypothesis--particularly for the relationship between social class measures (income, mother's education) and the dependent measures. Given the previously mentioned problems with the data which suggest attenuated findings, these results are even more impressive.

In general, the findings for the second grade sample are not impressive. While they are slightly stronger than the kindergarten findings, they do not present very convincing evidence in support of the hypothesis.

CHAPTER V

PHILADELPHIA ANALYSIS 2

Description of Analysis

The second major analysis performed involves a comparison of scores for two subgroups of a social background variable. But rather than combining the three test points into one measure, as was done for the previous analysis, this analysis treats the test points separately and thus does not take advantage of the linked data for individuals. The test measures are the same ones used in the composite measures in Analysis 1, three for each grade level. The measure of social background is a dichotomous variable which divides the sample into poverty and non-poverty classifications according to the 1971-72 NORC adaptation of the Office of Economic Opportunity poverty guidelines.

This analysis was originally performed dividing the sample into thirds based on income. Thirds were used in order to lessen the chance of misclassification by eliminating the middle group and comparing the top and bottom thirds. However, an inspection of the scores for the three groups uncovered a number of instances in which the scores for the middle third were lower than for the bottom third. The most reasonable explanation for this seemed to be that the middle income group tended to have larger families and thus were not in fact "richer" than those smaller families with less income. Consequently it seemed wise to select a social background measure which incorporated both income and family size. The poverty classification does this by determining poverty on the basis of both income and size of household. The formula for these calculations is given in Appendix D.

This analysis consists merely of presenting standardized scores for each test point for the three sets of tests for each grade for two groups: those classified as below poverty level (poor) and those above poverty level (non-poor).* The analysis for a given set of tests presents three pairs of standardized scores. The difference between the scores of the first pair reflects the relative distance between the poor and non-poor groups in spring 1972. The difference in the second pair reflects this relative distance on fall 1972, the end of the summer, and the third pair the distance in spring 1973, the end of the school year. The hypothesis suggests that the difference between the two groups (the relative distance between them) should be greater at the end of the summer than at the end of the school year (since both periods are the same length). In other words, there should be a relatively greater increase in distance from spring 1972 to fall 1972 than from fall 1972 to spring 1973.

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*The "non-poor" group includes some poor children insofar as the poverty guidelines are viewed as a stringent classification. For example, a household with ten people and an income of $7800 is not considered to be poor.

Table 11 presents these pairs of standardized scores for three sets of tests for each grade level. The left side names the grade level and tests--all of which are ordered Spring 1972, Fall 1972, Spring 1973. The first and second columns give the standardized scores for the two groups, poor and non-poor, respectively. The sample sizes for each grade level precede the scores in these columns. The third column gives the difference between the scores--the distance between the two groups, non-poor minus poor.

The expectation is that for each set of tests, the change from spring 1972 to fall 1972 will be greater than the change from fall 1972 to spring 1973. These changes are presented in Table 12. The column headed "Summer" is the fall 1972 difference minus the spring 1972 difference (from column 4 in Table 11). The column "School Year" is the Spring 1973 difference (from column 4, in Table 11).

Results

Looking for a pattern of greater spread over the summer than over the school year, it is seen in the kindergarten

Table 11: Standardized Scores by Subtest and Time of Testing for Poor (P) and Non-Poor (NP) Children and Their Difference (NP - P)

		1 Poor	2 Non-Poor	3 Difference (NP-P)
Kindergarten	n	132	92	
S72 Sounds		-.09	.09	.18
F72 Sounds		-.02	.20	.22
S73 Word Analysis		-.05	.30	.35
S72 Reading		-.05	.32	.37
F72 Reading		.01	.15	.14
S73 Total Reading		-.03	.19	.22
S72 Numbers		-.03	.36	.39
F72 Numbers		.04	.38	.34
S73 Math		-.06	.23	.29
First Grade	n	168	122	
S72 Word Analysis		.02	.15	.13
F72 Word Analysis		-.11	.21	.32
S73 Word Analysis		-.16	.20	.36
S72 Total Reading		-.02	.08	.10
F72 Total Reading		-.11	.27	.38
S73 Total Reading		-.15	.21	.36
S72 Math		-.01	.14	.15
F72 Math		-.10	.34	.44
S73 Total Math		-.08	.19	.27
Second Grade	n	159	112	
S72 Total Reading		-.11	.36	.47
F72 Total Reading		-.17	.37	.54
S73 Total Reading		-.08	.41	.49
S72 Spelling		-.05	.35	.40
F72 Spelling		-.14	.42	.56
S73 Spelling		-.11	.43	.54
S72 Total Math		-.06	.29	.35
F72 Total Math		-.09	.30	.39
S73 Total Math		-.01	.23	.24

Table 12: Difference Between Poor/Non-Poor Differences in Standardized Scores (Column 3, Table 11) for Summer (Fall 1972-Spring 1972) and School Year (Spring 1972-Fall 1972) by Grade

	Summer	School Year
Kindergarten		
Sounds	.04	.13
Reading	-.23	.08
Math	-.05	-.05
First Grade		
Word Analysis	.19	.04
Reading	.28	-.02
Math	.29	-.17
Second Grade		
Reading	.07	-.05
Spelling	.16	-.02
Math	.04	-.15

sample that none of the results goes in the expected direction. For Sounds and Reading, the distance between the groups shows a relative increase over the school year, and for Math, the relative change in position for the two groups is the same for the summer and the school year.

For the first grade sample results from all three sets of tests are in the expected direction. During the summer interval the distance between the poor and non-poor groups increases relatively for each measure at least two-tenths of a standard deviation (approximately). For Word Analysis and Reading there is virtually no change in relative position during the school year and for Math there is a relative decrease in distance between the groups.

For the second grade sample, the pattern is quite similar to the first grade sample. The results are all in the expected direction but the summer differences are not as large.

Overall, these results correspond very closely to the results of the analysis in Chapter IV. The hypothesis is supported most strongly by the first grade sample which presents a consistent pattern in the predicted direction. The second grade sample tends to support the hypothesis but not as convincingly as the first grade sample, while the kindergarten sample does not support the hypothesis.

CHAPTER VI

PHILADELPHIA ANALYSIS 3

Description of Analysis

The third analysis is a regression analysis which looks at summer learning and background in a somewhat different way. The question is whether background variables are stronger predictors of a child's score at the end of the summer than at the end of the school year, controlling for his prior test score. In other words, for children with the same score in the spring, is prediction of their fall score improved by knowing their income, for example? And similarly, for children with the same score in the fall, is prediction of the next spring's score (end of the school year) improved by knowing their income? The analysis consists of pairs of regressions to answer these questions. The hypothesis is tested by comparing the explanatory power of the background measures at the end of the summer and at the end of the school year, with the expectation that the effect of background variables will be stronger at the end of the summer than at the end of the school year.

The first equation in each pair of equations predicts the fall 1972 score from the preceding test score (spring 1972) and background measures. The second equation predicts the spring 1973 score from the fall 1972 score and the same background measures. This analysis was done in three ways, each using a different measure of the child's background. The first includes income, size of household and mother's education as the indices of social background. The second and third include only one variable for background: a composite measure of socio-economic status (SES) and home educational environment (HEE), respectively. These composites were formed by entering a number of items into a principal components analysis and using the weights from the first component to form the composite. Descriptions of the items included in each factor and their weights are given in Appendix E. The three sets of regressions were calculated using the same sets of tests as the previous analyses.

The choice of which background variables to include and in what form was somewhat arbitrary. Since the sample is relatively small and the background variables intercorrelated, including all possible background measures separately in an equation results in highly unstable coefficients. Thus some kind of reduction was necessary. The principal components approach is one way of reducing the number of variables by forming a composite. It has the advantage of producing one variable but the disadvantage of being difficult to interpret substantively. The three variables entered separately (income, household size and mother's education) were selected primarily because they are commonly used measures of social class and particularly because these same variables are being used in a study similar in design to this one (Heyns, in progress).

Table 13 presents standardized regression coefficients for three pairs of equations for each grade level. Each equation is in the form:

$$\text{Test} = \beta_1 \text{ Prior test} + \beta_2 \text{ log income} + \beta_3 \text{ household size} + \beta_4 \text{ mother's education.}$$

The test used as the dependent variable is listed in Column 1. Column 2 gives the coefficient and name of the preceding test. Columns 3-5 give the coefficients for Income, Household Size and Mother's Education. Column 6 gives the total R^2 for the equation. Table 14 gives the standardized coefficients for the two sets of regressions with the SES and HEE composites. Columns 1 and 2 give the coefficient for SES and the R^2 for the total equation for equations of the form: $\text{Test} = \beta_1 \text{ Prior Test} + \beta_2 \text{ SES}$

Columns 3 and 4 give the coefficient for HEE and the total R^2 for equations of the form:

$$\text{Test} = \beta_1 \text{ Prior Test} + \beta_2 \text{ HEE}$$

The coefficients for the prior test were not included because they are almost identical to those in Table 13.

Table 13: Standardized Regression Coefficients and Total R^2 for Three Pairs of Equations for Each Grade (Test on Prior Test, Income, Household Size, and Mother's Education)

1 DV	2 Prior Test***[1]	3 Income [2]	4 Household Size	5 Mother's Education	6 R^2
Kindergarten					
F72 Sounds	.61 S72 Sounds	.08	-.03	-.02	.39
S73 Word Analysis	.59 F72 Sounds	.12*	-.11*	.08	.40
F72 Reading	.64 S72 Reading	-.09	-.05	.06	.40
S73 Total Reading	.43 F72 Reading	.09	-.08	.04	.21
F72 Numbers Reading	.63 S72 Numbers	.05	-.06	.04	.42
S73 Math	.56 F72 Numbers	.08	-.03	.05	.34
First Grade					
F72 Word Analysis	.77 S72 Word Analysis	.14***	-.12**	.01	.64
S73 Word Analysis	.76 F72 Word Analysis	-.01	-.02	.04	.60
F72 Total Reading	.67 S72 Total Reading	.15***	-.07	.10*	.51
S73 Total Reading	.74 F72 Total Reading	.01	-.04	-.01	.55
F72 Math	.67 S72 Math	.13**	-.01	.04	.49
S73 Total Math	.74 F72 Math	-.01	-.06	.02	.55
Second Grade					
F72 Total Reading	.81 S72 Total Reading	.10**	-.03	.05	.72
S73 Total Reading	.78 F72 Total Reading	.06	.01	.02	.64
F72 Spelling	.85 S72 Spelling	.08**	-.05	.06*	.79
S73 Spelling	.91 F72 Spelling	.00	.02	-.04	.80
F72 Total Math	.80 S72 Total Math	.07	-.05	.01	.66
S73 Total Math	.73 F72 Total Math	.03	.00	.02	.55

$*p < .05$ $**p < .01$ $***p < .001$

[1] The coefficients of the prior tests in all equations are significant at the .001 level.

[2] Log Income.

Table 14: Standardized Regression Coefficients and Total R^2 for Six Pairs of Equations for Each Grade (Test on a. Prior Test and SES and b. Prior Test and Home Educational Environment)

		(a)		(b)	
	DV	SES	R^2	HEE	R^2
Kindergarten					
	F72 Sounds	.02	.39	.18***	.42
	S73 Word Analysis	.10*	.38	.00	.37
	F72 Reading	-.08	.39	.16***	.41
	S73 Total Reading	.07	.20	.02	.19
	F72 Numbers	.01	.41	.01	.41
	S73 Math	.05	.34	.08	.34
First Grade					
	F72 Word Analysis	.08*	.61	.14***	.63
	S73 Word Analysis	.04	.60	.07	.60
	F72 Total Reading	.20***	.52	.17***	.50
	S73 Total Reading	.00	.55	.06	.55
	F72 Math	.14***	.49	.12**	.48
	S73 Total Math	-.03	.55	.07	.55
Second Grade					
	F72 Total Reading	.10**	.72	.04	.71
	S73 Total Reading	.07*	.64	.07	.64
	F72 Spelling	.08**	.78	.08**	.78
	S73 Spelling	-.01	.79	.05	.80
	F72 Total Math	.04	.65	.04	.65
	S73 Total Math	.05	.55	-.01	.55

*$p < .05$
**$p < .01$
***$p < .001$

Since the samples are not independent (in fact they are the same), there is no obvious way to test the significance of the difference between the coefficients. The asterisks noting significance in the table should not be interpreted as denoting a significant difference between the coefficients; they denote only whether that coefficient was significant in the equation. Even though the samples are not independent, a crude test of significance could be made by treating them as independent and testing the difference between the raw coefficients. Unfortunately again, since the dependent variables are different tests in each equation, a comparison between raw coefficients is meaningless. Thus the only "test" of the hypothesis is the direction of the difference. The hypothesis is supported if the coefficient for each background measure is larger in the first equation of each pair--that is, the equation which predicts the fall 1972 score. For household size, larger means more negative since a large household is generally associated with low SES. The conclusions are presented below by grade.

Results by Grade

Kindergarten

In Table 13, two of the nine pairs of coefficients differ in the expected direction. In Table 14, for SES none of the three pairs of coefficients differs in the expected direction. For HEE, however, two of the three differ in the expected direction. Overall, these results are not impressive for any of the SES measures, but do follow the expected pattern closely for the HEE principal component.

First Grade

In Table 13, only two of nine pairs of coefficients do not differ in the expected direction: Household Size with Math and Mother's Education with Word Analysis. In Table 14, all three pairs of coefficients for both SES and HEE differ in the expected direction. This is fairly impressive.

Second Grade

Table 13 shows that all but one of the pairs of coefficients differ in the expected direction. The one nonconformist is Mother's Education with Math. In Table 14, two of the three pairs for SES differ in the expected direction. The same is true for HEE: two out of three.

Summary

Overall these results follow closely the pattern of results in the previous analyses with the strongest evidence coming from the first grade sample, followed by the second grade sample, with the kindergarten sample providing no evidence in support of the hypothesis.

CHAPTER VII

CONCLUSIONS FROM THE PHILADELPHIA STUDY

Consideration of Curriculum Models and Test Methods

This section describes briefly two subsidiary sets of analyses and then presents the overall conclusions from the Philadelphia data. Chapter II noted that the original design of the study included a plan to relate summer and school year growth differences to characteristics of the instructional programs. For this reason three different Follow Through curriculum models were included in the sample as well as non-Follow Through children--those without a pre-specified curriculum model. Since there was no information on the actual implementation of the models in these projects, analyzing the data by curriculum model was not part of the main analysis. On the chance that interpretable patterns might emerge, all the analyses on the Philadelphia data were repeated broken down by four groups: the three Follow Through models and the non-Follow Through group. As expected, these analyses by group did not reflect any interpretable patterns. For the interested reader, descriptions of the curriculum models and the results of these analyses are presented in Appendix F.

A second set of subsidiary analyses was performed to test the hypothesis that the size or significance of results is a function of the test metric employed. This was tested by performing two analyses using raw scores, scores standardized on the sample, publisher's standard scores, grade equivalents and percentiles. With the exception of grade equivalents in two instances, the size and significance of the results differed little among the metrics. This does not solve the problem of estimating absolute growth but does suggest that the findings in the original analyses are not merely a function of the metric employed (scores standardized on the sample). These metric analyses are discussed more fully and the results presented in Appendix G.

Overall Conclusions

The Philadelphia data were studied in order to determine whether there is a relationship between social background and differences in school year versus summer achievement growth. The hypothesis was that exposure to school has an equalizing impact by preventing the gap between poor and non-poor children from increasing as much as it would in the absence of school. Because this study does not even approximate an experiment, the purpose of analyzing the data was to provide a description of the relationships in these data (with the hypothesis serving as a model of the relationships which I expected to find) rather than estimates of effects.

In such a situation, there are obviously an infinite number of ways to describe relationships in the data set. The choice of the three approaches described in the preceding sections was based on an attempt to provide descriptors with different assumptions behind them and to present conceptually sensible descriptions, particularly in the context of the weaknesses in the data described in Chapter III. As a consequence, each of the three approaches has its own set of weaknesses.

The first approach, that of defining the Growth Difference variable, was based on the conception that the real variable of interest was a difference in summer and school year rates of growth. While this approach seems conceptually sound, it produces a variable which is both unreliable* and difficult to interpret. It is more unreliable than the individual tests because it is formed by the difference of two change scores. It is difficult to interpret because the change in test battery required a prior standardization of the scores, thus producing an indicator of relative change, not growth.

The second approach was an attempt to simplify the question by simply comparing the scores of poor and non-poor children at each test point on the assumption that they would be farther apart at the end of the summer than at the end of the school year. This approach ignores the fact that the data can be linked at the individual level. Additionally, it requires standardizing the scores in order to make comparisons across the school year. Its advantage is that it allows a simple comparison of two numbers over time.

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*A rough estimate of the reliability is .7 (see footnote, page 39).

The third approach rests on the assumption that the linear additive model is appropriate to these data. Clearly, this assumption cannot be thoroughly tested, nor can it be determined whether the equation is fully specified. It additionally suffers from the practical problems of how to select and combine a number of different measures of home background as well as what to control for.

The difficulties described above pose problems only insofar as one wishes to make inferences from these data. Each of the analyses provides an accurate description of parts of the data. An encouraging outcome is the fact that the three analyses produce roughly the same pattern of results. In each approach, the first grade results provide strong support for the hypothesis. The second grade results provide moderate support and the kindergarten results are inconclusive. It is difficult to think of a convincing explanation for the strongest evidence coming from the middle group (first graders). On the other hand, given the problems with the data (see Chapter IV), all of which work against finding strong relationships, it is surprising to discover any support for the hypothesis.

Overview of Summer Projects Study

The next chapter of this report presents the second study of the impact of school exposure. In order to relate the impact of school to social class, it is necessary to have an experiment which involves the random assignment of children from a wide range of social backgrounds to school and no school. An obvious constraint is that such an experiment cannot occur during the school year. A second major constraint stems from the characteristics of Follow Through children. They are predominantly poor and do not reflect much variation on social background measures. On the positive side, though, in several projects children were in fact randomly assigned to summer school participation. While the constraint of limited variance on background characteristics does not permit relating the impact of summer school to social background, this experiment does permit an assessment of the short term and long term (one school year) impact of exposure to summer school. This study is presented in the following chapter. The final chapter of the report presents the overall conclusions and recommendations stemming from both the Philadelphia and Summer Projects Studies.

CHAPTER VIII

SUMMER PROJECTS STUDY

The Summer Projects Study was designed to assess the short and long term impact of several Follow Through summer programs. In order to estimate the immediate impact of a summer program, it was necessary to have achievement measures in the spring of 1972 and in the fall of 1972. To assess the long term impact the study includes a test in the spring of 1973 allowing one to determine whether effects persist throughout the following school year. Additionally, the Follow Through Parent Interview (1972) was given in the fall of 1972. The unusual feature of the design is that children were randomly assigned to participate in the program. Random assignment is a rare phenomenon in educational field research and particularly in program evaluation.

This chapter will first provide some of the history of the design and implementation of the study in order to communicate some of the difficulties involved in implementing a randomized experiment. This is followed by a presentation of the characteristics of the sample, the analysis and the findings.

Background

In the summer of 1971 a number of Follow Through projects were funded for two years including funds for a program during the summer of 1972. The U. S. Office of Education (USOE) stipulated that a random assignment procedure be employed. The guidelines were that parents who wanted their children in the summer program submit applications from which twenty-five to thirty children would be selected for participation in the program.

Eleven projects were originally funded in this way. Since the funds for the summer program were limited, the program was restricted to one grade level: children who had just completed the first year of the Follow Through program (kindergarten or first grade, whichever was the entering level of the project).. One project was dropped before preparations for the summer program began. The remaining ten projects were scheduled to implement the randomization procedures agreed on by USOE and Stanford Research Institute, the data collection contractor for the national evaluation.

These procedures required each project to define a pool of potential program participants according to three criteria:

1. The child's parents were interested in having the child attend the summer program;
2. The child had a pre-test score on the Wide Range Achievement Test (WRAT) (Jastak and Jastak, 1965) from the fall of 1971; and

3. The child's family was classified as low-income.

A list of children was prepared for each project in order of their fall 1971 WRAT scores. After all children not meeting the criteria were removed from the list, the remainder were divided in half, forming two groups: those "high" on the WRAT and those "low" on the WRAT. From both groups fifteen children were to be randomly drawn for participation in the summer program. The children not selected for program participation would form the control group.

Of the ten sites, serious problems in following the procedure arose in four of them. These four were then dropped from the study. In two of these projects there was to be a city-wide summer program; thus the only available controls would be children whose parents were not interested in having them attend a summer program. The random control group was expected to be attending a summer program similar in nature to the Follow Through summer program. In another project a summer program was already scheduled for all the Follow Through kindergarten children whose parents were interested in having their child in a summer program, once again leaving no group of children for controls. In the fourth dropped project, there were only thirty-six children who met the three criteria for the original pool; thus there were not enough left for controls.

This left six projects still included in the Summer Project Study. Of these six, two projects had only six children in the control group who had received all tests.* Consequently these were not included in the analysis. Of the four remaining for which the data were analyzed, each has its own peculiarities. In Chattanooga, the local Follow Through director and local parent group insisted that all children, whether or not they were tested in the Fall of 1971, be included in the pool. In Kansas City, some of the controls probably ended up in a Title I summer program similar to the Follow Through summer program. In Tuskegee, it was necessary to restrict the pool to three of the eight Follow Through schools because of transportation difficulties. In Uvalde, there was no Fall 1971 testing so that the sample could not be stratified on the WRAT. Instead the randomization was stratified on sex.

Sample

The following table shows the number of experimental and control children who took all three tests in each of the four projects included in the analysis.

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*Because of literacy and accessibility problems not all parents were contacted in one project. The parents were randomly ordered for home visits and the first 30 who were interested were selected for the program. Those who were selected but didn't show were called the control group (the six).

Table 15: Number of Experimental and Control Children with Three Tests

Project	Experimental	Control
Kansas City	32	12
Tuskegee	30	23
Uvalde	31	24
Chattanooga	29	15

The only check on whether children actually attended a summer project or not was one item on the parent interview. Since this item had never been used before on the interview and since very few parents answered the subparts of the question, we have no real information on how reliable the question is. The table below indicates how many parents of the experimental and control children claimed that their child did or did not attend a summer program.

Table 16: Experimental and Control Group Status by Parental Report on Child's Summer School Attendance

	Experimental			Control		
	Did Attend	Did Not	NA	Did Attend	Did Not	NA
Kansas City	28	2	2	5	6	1
Tuskegee	29	1	0	2	20	1
Uvalde	19	10	2	1	23	0
Chattanooga	21	0	8	0	11	4

The expectation that some of the controls in Kansas City would be in a Title I program seems to be true. The two most suspect groups are the ten experimental children in Uvalde who are listed as not having had a summer program and the eight non-respondents in Chattanooga. In general, however, the children designated as experimental attended a summer program and the controls did not according to parents' reports. However, in order to be more confident in the results, the analyses were performed on both samples: the whole sample and the subset of children whose designation as experimental or control agreed with the parental report on summer school attendance.

Of the four projects, one (Kansas City) is an entering kindergarten project; that is, the children attended summer school between kindergarten and first grade. The other three are entering first grade so that these children are one year older than the Kansas City children. Table 17 presents the mean for six background variables and the Fall 1971 WRAT scores for the experimental and control children in each of the four projects. Because of the random assignment, these variables are expected to have similar distributions for the two groups. The sex distributions (given by percent female) are similar for the experimental and control groups in each project. The average number of months of Head Start are also similar within projects

Table 17: Comparison of Experimental (E) and Control (C) Groups in Four Summer Projects on Sex, Prior Head Start, Household Size, Mother's Education, Poverty, Income, and Fall 1971 WRAT Score

	Kansas City		Tuskegee		Uvalde		Chattanooga	
	E	C	E	C	E	C	E	C
% Female	44%	33%	57%	50%	55%	42%	52%	50%
Average Months of Head Start	3.6	4.0	8.6	6.8	7.0	7.0	6.0	3.8
Average Household Size	5.8	7.0	5.8	6.9	7.7	7.0	5.9	6.6
Average Years Mother's Education	11.1	10.3	10.6	9.9	5.4	6.7	9.7	9.4
% Poverty	66%	60%	83%	73%	93%	71%	76%	91%
Average Income in Thousands	4.3	5.1	3.7	3.9	3.3	4.5	3.7	2.9
Fall 1971 Total WRAT	27.8	23.7	42.8	46.9	-	-	41.6	42.0
WRAT s.d.	9.8	9.8	11.1	10.0			11.9	10.9
Range of n*	29-32	10-12	27-30	19-22	27-29	23-24	19-21	9-12

*The range is given since not all subjects had responses on all items.

with the exception of Chattanooga where the experimental children average over two months more of Head Start. The average household size is smaller for the experimental group in two of the projects and larger in two but never differs by more than 1.2 persons. For all of the projects except Chattanooga, the experimental group has a higher percentage of poverty level children and a lower income than the control group. For Chattanooga, the opposite is true. On the Fall 1971 WRAT, the test which was used to stratify the groups originally, the experimental group is almost half a standard deviation ahead of the controls in Kansas City. In Tuskegee, the control group is over one-third of a s.d. ahead of the experimental group. In Chattanooga, they are almost identical. Overall, the experimental and control groups are not very different. The only statistically significant difference ($p < .05$) is the difference in income for Uvalde.

Table 18 presents these same figures for the matched sample (the sample for which experimental and control designations agree with parental report on summer school attendance). Overall, these figures correspond very closely to those for the whole sample.

Analysis

The analysis consists of a comparison of scores (Spring 1972, Fall 1972, Spring 1973) for each of the four projects. Tables 19, 21, 23 and 25 present the summary data for each of the four projects respectively for the whole sample. Following each table is a second table (20, 22, 24 and 26) presenting the same data for the matched sample. In each table, the first column gives the raw scores for

Table 18: Comparison of Experimental (E) and Control (C) Matched Sample* Groups in Four Summer Projects on Sex, Prior Head Start, Household Size, Mother's Education, Poverty, Income, and Fall 1971 WRAT Score

	Kansas City		Tuskegee		Uvalde		Chattanooga	
	E	C	E	C	E	C	E	C
% Female	.43	.50	.55	.50	.58	.44	.52	.46
Average Months of Head Start	3.9	4.7	8.6	7.0	6.4	6.9	6.0	4.1
Average Household Size	5.8	7.5	5.7	7.1	6.8	6.9	5.9	6.6
Average Years Mother's Education	7 11.1	10.0	10.6	9.6	5.7	6.8	9.7	9.4
% Poverty	.64	.40	.83	.75	.89	.70	.76	.91
Average Income in Thousands	4.4	6.4	3.5	4.0	3.7	4.5	3.7	2.9
Fall 1971 Total WRAT	28.8	24.8	43.6	47.0	-	-	41.6	44.2
WRAT s.d.	9.9	6.1	10.3	8.3			11.9	8.5
n	28	6	29	20	19	23	20	11

*Children whose classification as experimental or control agrees with parent interview report of summer school attendance.

the experimental group for each test, and column 2 gives that group's standard deviation. The tests are grouped in the same way as in the previous analyses: Spring 1972, Fall 1972, Spring 1973 for three subject areas. Also included are the Fall 1971 and Spring 1972 WRAT scores except

Table 19: Kansas City Summer Project Raw Scores, Standard Deviations, and Standardized Scores for Experimental (E) and Control (C) Groups and Difference in Standardized Scores (Expermental Minus Control) on Four Sets of Tests

	Raw				Standardized		
	E (N=32)		C (N=12)		E	C	Diff.
Test	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	$\overline{X}$	E-C
S '72 Sounds	26.8	7.9	18.8	6.1	1.75	.40	1.35
F '72 Sounds	28.9	6.6	19.6	5.3	1.34	-.08	1.42
S '73 Word Analysis	32.0	7.2	22.2	9.1	.78	-.26	1.04
S '72 Reading	20.3	4.9	14.4	2.9	1.46	.12	1.34
F '72 Reading	21.8	5.1	15.1	3.9	1.32	-.17	1.49
S '73 Reading	50.8	18.0	33.3	11.4	.49	-.55	1.04
S '72 Numbers	15.8	5.1	11.7	2.7	.82	.03	.79
F '72 Numbers	18.7	6.5	12.3	4.2	.40	-.50	.90
S '73 Math	37.4	11.7	26.3	9.9	.03	-.75	.78
F '71 WRAT	27.8	9.8	23.7	9.8	-.01	-.37	.36
S '72 WRAT	56.4	10.7	44.8	9.8	.96	-.08	1.04

Table 20: Matched Sample* in Kansas City Summer Project: Raw Scores, Standard Deviations, and Standardized Scores for Experimental (E) and Control (C) Groups and Difference in Standardized Scores (Experimental Minus Control) on Four Sets of Tests

	Raw				Standardized		
	E (N=28)		C (N=6)		E	C	Diff.
Test	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	$\overline{X}$	E-C
S '72 Sounds	26.1	8.1	21.5	6.0	1.63	.85	.78
F '72 Sounds	28.8	6.8	21.2	5.7	1.32	.17	1.15
S '73 Word Analysis	31.9	7.6	24.7	7.4	.77	.00	.77
S '72 Reading	20.4	4.9	15.3	2.3	1.47	.33	1.14
F '72 Reading	22.0	4.9	16.7	3.4	1.36	.18	1.18
S '73 Reading	50.9	18.2	38.7	10.5	.49	-.23	.72
S '72 Numbers	15.4	5.0	12.3	3.1	.75	.16	.59
F '72 Numbers	18.3	6.6	12.7	2.9	.35	-.45	.80
S '73 Math	36.5	11.6	33.0	5.0	-.03	-.28	.25
F '71 WRAT	28.8	9.9	24.8	6.1	.07	-.27	.34
S '72 WRAT	56.7	10.8	48.3	9.0	.99	.24	.75

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*Children whose classification as experimental or control agrees with parent interview report of summer school attendance.

Table 21: Tuskegee Summer Project Raw Scores, Standard Deviations, and Standardized Scores for Experimental (E) and Control (C) Groups and Difference in Standardized Scores (Experimental Minus Control) on Four Sets of Tests

	Raw				Standardized		
	E (N=30)		C (N=22)		E	C	Diff.
Test	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	$\bar{X}$	E-C
S '72 Word Analysis	21.0	8.1	23.7	8.2	-.02	.26	-.28
F '72 Word Analysis	24.0	8.3	24.0	7.4	.19	.19	0
S '73 Word Analysis	18.8	7.7	19.8	6.9	-.19	-.07	-.12
S '72 Total Reading	36.9	16.2	39.1	14.0	-.13	.00	-.13
F '72 Total Reading	47.7	16.5	43.0	15.6	.42	.12	.30
S '73 Total Reading	43.7	18.2	44.5	16.5	-.03	.01	-.04
S '72 Math	29.1	11.6	32.7	11.4	-.33	-.06	-.27
F '72 Math	34.5	12.3	35.6	10.2	.11	.21	-.10
S '73 Math	54.7	17.4	57.8	15.9	-.30	-.14	-.16
F '71 WRAT	42.8	11.1	46.9	10.0	1.26	1.61	-.35
S '72 WRAT	70.3	11.7	72.7	10.0	2.21	2.43	-.22

Table 22: Matched Sample* in Tuskegee Summer Project Raw Scores, Standard Deviations, and Standardized Scores for Experimental (E) and Control (C) Groups and Difference in Standardized Scores (Experimental Minus Control) on Four Sets of Tests

	Raw				Standardized		
	E (N=29)		C (N=20)		E	C	Diff.
Test	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	$\bar{X}$	E-C
S '72 Word Analysis	21.3	8.1	23.6	8.2	.01	.25	-.24
F '72 Word Analysis	24.3	8.3	24.1	7.1	.23	.19	.04
S '73 Word Analysis	19.2	7.4	19.5	6.7	-.14	-.11	-.03
S '72 Total Reading	37.6	16.1	38.5	13.3	-.09	-.03	-.06
F '72 Total Reading	48.5	16.2	42.2	15.2	.47	.07	.40
S '73 Total Reading	43.9	18.5	43.5	15.9	-.02	-.04	.02
S '72 Math	29.8	11.2	32.6	11.8	-.29	-.07	-.22
F '72 Math	35.2	12.0	35.6	10.6	.17	.20	-.03
S '73 Math	55.4	17.3	57.9	16.5	-.26	-.14	-.12
F '71 WRAT	43.6	10.3	47.0	8.3	1.33	1.62	-.29
S '72 WRAT	71.4	10.2	72.5	10.4	2.31	2.40	-.09

*Children whose classification as experimental or control agrees with parent interview report of summer school attendance.

Table 23: Uvalde Summer Project Raw Scores, Standard Deviations, and Standardized Scores for Experimental (E) and Control (C) Groups and Difference in Standardized Scores (Experimental Minus Control) on Four Sets of Tests

	Raw				Standardized		
	E (N=29)		C (N=24)		E	C	Diff.
Test	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	$\overline{X}$	E-C
S '72 Word Analysis	23.6	7.5	26.3	5.4	.25	.53	-.28
F '72 Word Analysis	27.4	7.0	26.3	6.0	.57	.44	.13
S '73 Word Analysis	23.2	6.2	21.0	6.6	.35	.07	.28
S '72 Total Reading	30.6	11.8	31.5	11.4	-.51	-.46	-.05
F '72 Total Reading	45.7	15.0	43.0	14.4	.29	.12	.17
S '73 Total Reading	49.0	14.1	47.7	14.3	.26	.19	.07
S '72 Math	21.9	7.6	24.0	7.9	-.89	-.73	-.16
F '72 Math	31.2	8.4	29.0	9.2	-.16	-.34	.18
S '73 Math	57.0	12.0	58.1	11.9	-.18	-.12	-.06
S '72 WRAT	64.2	9.6	67.6	12.0	1.66	1.97	-.31

Table 24: Matched Sample* in Uvalde Summer Project Raw Scores, Standard Deviations, and Standardized Scores for Experimental (E) and Control (C) Groups and Difference in Standardized Scores (Experimental and Control) on Four Sets of Tests

	Raw				Standardized		
	E (N=19)		C (N=23)		E	C	Diff.
Test	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	$\bar{X}$	E-C
S '72 Word Analysis	24.1	7.6	26.3	5.5	.31	.54	-.23
F '72 Word Analysis	29.6	4.4	26.6	5.9	.82	.48	.34
S '73 Word Analysis	25.3	5.1	21.3	6.5	.60	.11	.49
S '72 Total Reading	31.3	10.9	31.8	11.6	-.47	-.44	-.03
F '72 Total Reading	49.3	11.4	43.8	14.2	.52	.17	.35
S '73 Total Reading	53.8	12.4	48.2	14.3	.52	.21	.31
S '72 Math	22.0	7.2	24.1	8.0	-.88	-.71	-.17
F '72 Math	32.4	6.8	29.7	8.7	-.06	-.28	.22
S '73 Math	57.9	11.6	59.0	11.3	-.13	-.08	-.05
S '72 WRAT	65.9	9.6	68.0	12.1	1.82	2.01	-.19

*Children whose classification as experimental or control agrees with parent interview report of summer school attendance.

Table 25: Chattanooga Summer Project Raw Scores, Standard Deviations, and Standardized Scores for Experimental (E) and Control (C) Groups and Difference in Standardized Scores (Experimental Minus Control) on Four Sets of Tests

	Raw				Standardized		
	E (N=21)		C (N=12)		E	C	Diff.
Test	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	$\bar{X}$	E-C
S '72 Word Analysis	12.6	4.9	14.2	4.0	-.92	-.75	-.17
F '72 Word Analysis	15.3	6.2	15.2	6.2	-.79	-.81	.02
S '73 Word Analysis	13.1	4.2	13.6	4.6	-.88	-.83	-.05
S '72 Total Reading	22.3	7.3	25.6	7.7	-1.01	-.81	-.20
F '72 Total Reading	28.4	9.7	27.8	7.5	-.81	-.85	.04
S '73 Total Reading	25.9	7.0	28.7	13.2	-1.00	-.85	-.15
S '72 Math	20.1	8.9	25.5	8.3	-1.02	-.61	-.41
F '72 Math	30.3	11.9	32.3	8.8	-.23	-.07	-.16
S '73 Math	43.0	12.0	47.8	11.3	-.91	-.66	-.25
F '71 WRAT	41.6	11.9	42.0	10.9	1.16	1.20	-.04
S '72 WRAT	62.2	9.7	69.1	9.2	1.48	2.10	-.62

Table 26: Matched Sample* in Chattanooga Summer Project Raw Scores, Standard Deviations, and Standardized Scores for Experimental (E) and Control (C) Groups and Difference in Standardized Scores (Experimental Minus Control) on Four Sets of Tests

	Raw				Standardized		
	E (N=21)		C (N=11)		E	C	Diff.
Test	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	$\overline{X}$	E-C
S '72 Word Analysis	12.6	4.9	14.3	4.1	-.92	-.74	-.18
F '72 Word Analysis	15.3	6.2	15.5	6.3	-.79	-.76	-.03
S '73 Word Analysis	13.1	4.2	13.5	4.7	-.88	-.84	-.04
S '72 Total Reading	22.3	7.3	26.5	7.4	-1.01	-.76	-.25
F '72 Total Reading	28.4	9.7	28.5	7.5	-.81	-.81	.00
S '73 Total Reading	25.9	7.0	29.2	13.7	-1.00	-.82	-.18
S '72 Math	20.1	8.9	25.6	8.7	-1.02	-.60	-.42
F '72 Math	30.3	11.9	32.5	9.1	-.23	-.05	-.18
S '73 Math	43.0	12.0	48.5	11.7	-.91	-.63	-.28
F '71 WRAT	41.6	11.9	44.2	8.5	1.16	1.38	-.22
S '72 WRAT	62.2	9.7	68.9	9.6	1.48	2.08	-.60

*Children whose classification as experimental or control agrees with parent interview report of summer school attendance.

for Uvalde in Fall 1971. Columns 3 and 4 give the raw means and standard deviations for the control group. It is important to remember that the Spring 1973 test in each set of tests is a different test than Fall and Spring 1972; consequently, these scores cannot be compared directly. In order to compare them they have been transformed into standardized scores in columns 5 and 6 for the experimental and control groups, respectively.

The scores look a little strange because, for convenience in programming, they were standardized using the Philadelphia sample's means and standard deviations. Since the transformation is linear, the choice of metric is arbitrary and does not affect comparisons of relative position or relative distance. But it does make some of the numbers appear inconsistent. The MAT scores for Tuskegee, Uvalde and Chattanooga are predominantly negative because the corresponding age group in Philadelphia had a year more of school. Philadelphia has kindergartens and these three projects do not. The WRAT scores look quite large because for the same three projects they are standardized against a group one year younger. The WRAT was given at the beginning and end of the year in which the child entered school. Since children enter in kindergarten in Philadelphia and entered in first grade in these projects, the children in these projects are a year older.

The final column (7) gives the difference between the experimental group's and control group's standardized score for each test (E-C). This is given as an indication of the positions of the groups relative to each other at each test point.

The hypothesis of a summer program effect would argue that the experimental group should improve relative to the control group at the end of the summer and that at least some of this improvement should persist during the school year. Thus the difference between the two groups in the Fall of 1972 should be greater (more positive or less negative) than the difference in the Spring of 1972. Likewise the difference in the Spring of 1973 should be greater than the difference at the beginning of the summer--but probably not as great as the difference at the end of the summer. Such a pattern should show a summer program impact, part of which lasted through the following school year.

Results

The data for the Kansas City summer project are suspect because of the large difference between the experimental and control groups before the summer program (over a standard deviation in Table 19). While this difference is somewhat less for the matched sample (Table 20), it is still large enough to raise questions about the adequacy of the randomization procedure. Consequently it seems impossible to draw any conclusions from these data.

In the three other projects,* this problem does not exist. In fact, for most of the test a reversal occurs--the experimental group begins the summer behind the control group and ends the summer ahead. In Tuskegee, during the summer the experimental group improves more relative to the control group with the relative improvement ranging from .15 in Math to .43 in Reading (Table 21). For all three sets of tests the difference between the groups increases again over the school year but the difference at the end of the school year is not as large as the difference in Spring 1972. This indicates that the summer program is having a short term effect, some of which persists through the following school year. The results for the matched sample follow the same pattern (Table 22). However, it is interesting to note that the difference between the groups decreased somewhat (.13 for the whole sample, .20 for the matched sample) during the school year preceding the summer program. (See the F '71 and S '72 WRAT scores.)

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*These three projects all have children who entered school in first grade without kindergarten; thus, they have had one year less school than the Philadelphia sample. This explains why most of the standardized scores (which used the Philadelphia mean and variance) are negative.

Since this trend is reversed in the year following the summer program, it is difficult to conclude with confidence that the summer program has a lasting impact.

In Uvalde for the whole sample the relative improvement of the experimental group over the control group ranges from .22 in Reading to .41 in Word Analysis (Table 23). In Word Analysis the experimental group continues to increase its edge over the control group during the school year from .13 to .28. In Reading and Math the gain of the experimental group over the control group decreases but still ends up ahead of the control group as compared to Spring 1972. The data for the matched sample reflect the same patterns but with a larger summer gain for the experimentals in Word Analysis and Reading and a sustained gain in Reading through the following school year. These data seem to support the hypothesis of a summer program impact which is partially sustained through the following school year.

The data for Chattanooga are similar to those for Uvalde. The experimental group begins the summer behind the controls, gains more relative to the controls over the summer, and loses some but not all of the summer gain during the school year. This can be interpreted as a summer program effect which persists a little through the school year. It is interesting to note that the controls gained considerably more relative to the experimentals during the school year preceding the summer program (see F '71 and S '72 WRAT). While the S '72 WRAT difference suggests that the groups may not be entirely comparable, this difference is not as large for the other tests. The whole sample and matched sample yield almost identical results which is not surprising since they differ by only one control child.

The following chapter presents a summary of the conclusions from both the Philadelphia Study and the Summer Projects Study.

CHAPTER IX

SUMMARY OF CONCLUSIONS

The major question in this endeavor was whether exposure to schooling reduces the difference in achievement growth between poor and non-poor children. This question could not be answered directly with the Follow Through data but could be approached indirectly in two ways. The first, the Philadelphia Study, describes the relationships between achievement growth and social background. The findings from this study provide some support for the notion that exposure to schooling attenuates the relationship between achievement growth and social background.

The kindergarten data from Philadelphia provide no support for the hypothesis, the first grade sample provides considerable support and the second grade sample provides some. But it is important to remember that the summer interval contains several weeks of school, that there are no rich children, and that the measures, particularly Growth Difference, are somewhat unreliable. All of these problems would have the effect of reducing the size of any relationships. Consequently, it is not surprising that none of the effects found is large.

The second approach, the Summer Projects Study, provides estimates of the effects of participation in four Follow Through summer programs. One of these was not interpreted because of suspect data. In the other three, the findings indicate that the summer programs do have a short term impact (as do most programs) and there is some evidence that part of the effect persists through the following school year.

The Philadelphia Study has pointed up the fact that survey research cannot provide a basis for clear causal inferences. The Summer Projects Study has demonstrated that randomized experimentation is possible--albeit not without several problems. It would be nice to be able to conclude without equivocation that if poor children lose more relative to rich children over the summer than during the school year, that summer school as an intervention prevents this increase in gap. But that question could not be asked of these data. An answer to this question would require an experiment designed to isolate the relationship between social background measures and the impact of a summer program.

APPENDICES

APPENDIX A

FORMATION OF HOME EDUCATIONAL ENVIRONMENT COMPOSITE IN CHAPTER IV

APPENDIX A

FORMATION OF HOME EDUCATIONAL ENVIRONMENT COMPOSITE IN CHAPTER IV

The Home Educational Environment (HEE) composite was formed simply by summing the responses for six variables for those subjects with valid responses on all six items. The items and their possible values are the following:

1) How often does child come to you for help on school work?

Response	Value
every day	5
several times a week	4
once a week	3
about once a month	2
never	1

2) How often does child talk about what's happening in class?

Scored same as #1 above.

3) How often does child read a book at home other than school books?

Response	Value
every day	4
several times a week	3
once a week	2
about once a month	1

4) How often does child read out loud to someone at home?

Scored same as #3 above.

5) When child has a chance to choose what to do around the house, how often does he choose to look at a book or magazine?

Response	Value
almost every day	5
often	4
once in a while	3
seldom	2
never	1

6) How often does someone at home read to child?

Scored same as #3 above.

The means and standard deviations for each variable are presented below by grade level.

	Kindergarten		First Grade		Second Grade	
	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD
Help on School Work	4.3	1.2	4.3	1.1	4.1	1.2
Talk about Class	4.7	.7	4.8	.9	4.5	.9
How often Read	3.2	.8	3.1	.8	3.2	.9
Read Out Loud	3.2	.8	3.0	.8	2.9	.8
Choose to Read	4.1	1.0	3.9	1.1	3.9	1.0
Is Read To	2.9	.8	2.6	.8	2.6	.8

APPENDIX B

SCATTERPLOTS FOR CHAPTER IV WITH NON-SIGNIFICANT CORRELATIONS

APPENDIX B

SCATTERPLOTS FOR CHAPTER IV WITH NON-SIGNIFICANT CORRELATIONS

Figure	Grade	Growth Difference Test Variable**	Background Measure
8	K	Sounds	Income
9	K	Sounds	HEE*
10	K	Math	Income
11	K	Math	HEE
12	1	Reading	HEE
13	1	Math	HEE
14	2	Reading	Income
15	2	Reading	HEE
16	2	Spelling	HEE
17	2	Math	Income
18	2	Math	HEE

---

* Home Educational Environment (see Appendix A)

** From the Metropolitan Achievement Test (Durost _et al_., 1970).

FIGURE 8

SCATTERPLOT OF SOUNDS/WORDS ANALYSIS GROWTH DIFFERENCE AND INCOME: KINDERGARTEN (N=252)

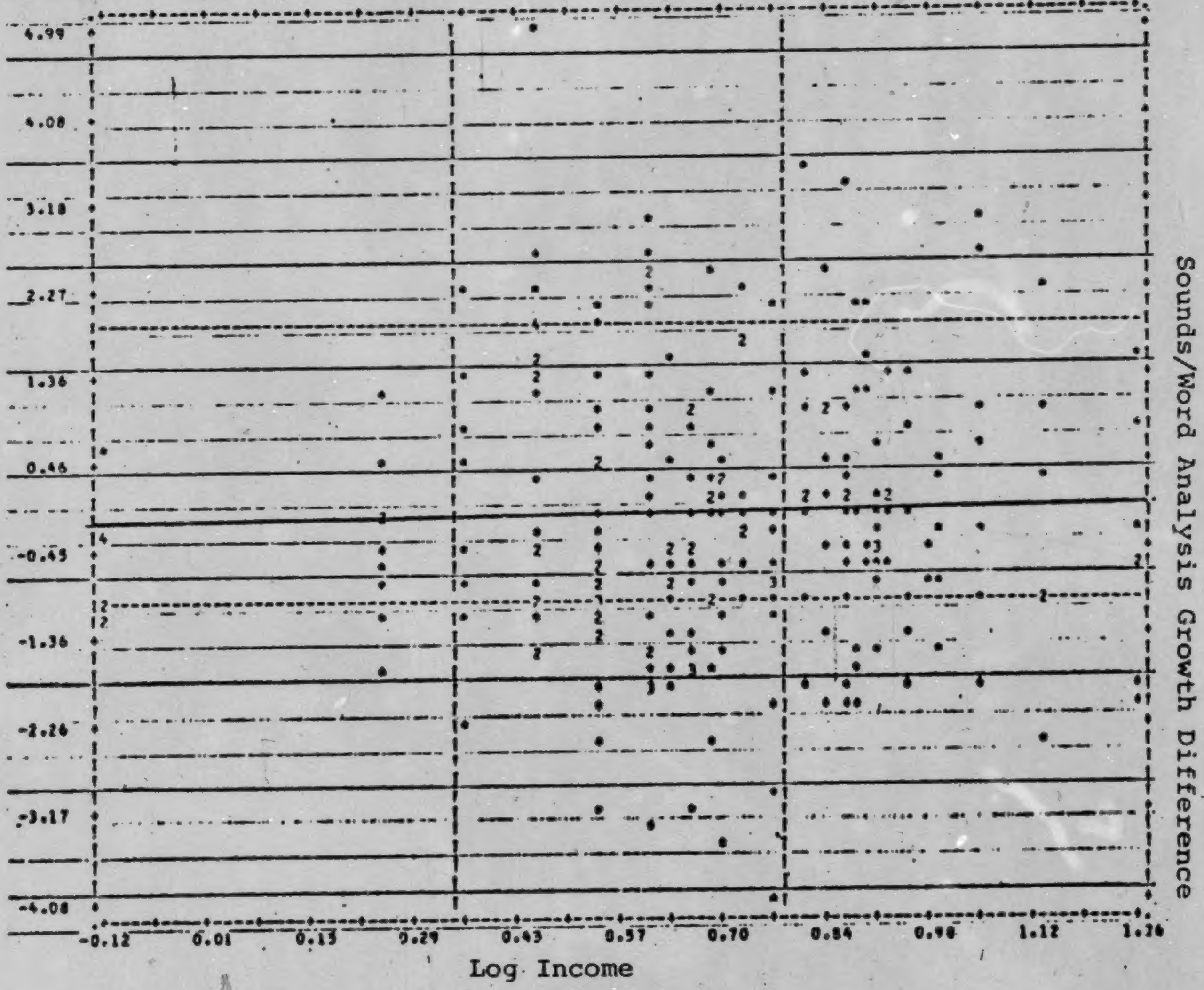


FIGURE 9

SCATTERPLOT OF SOUNDS/WORD ANALYSIS GROWTH DIFFERENCE AND HOME EDUCATIONAL ENVIRONMENT: KINDERGARTE
(N=157)

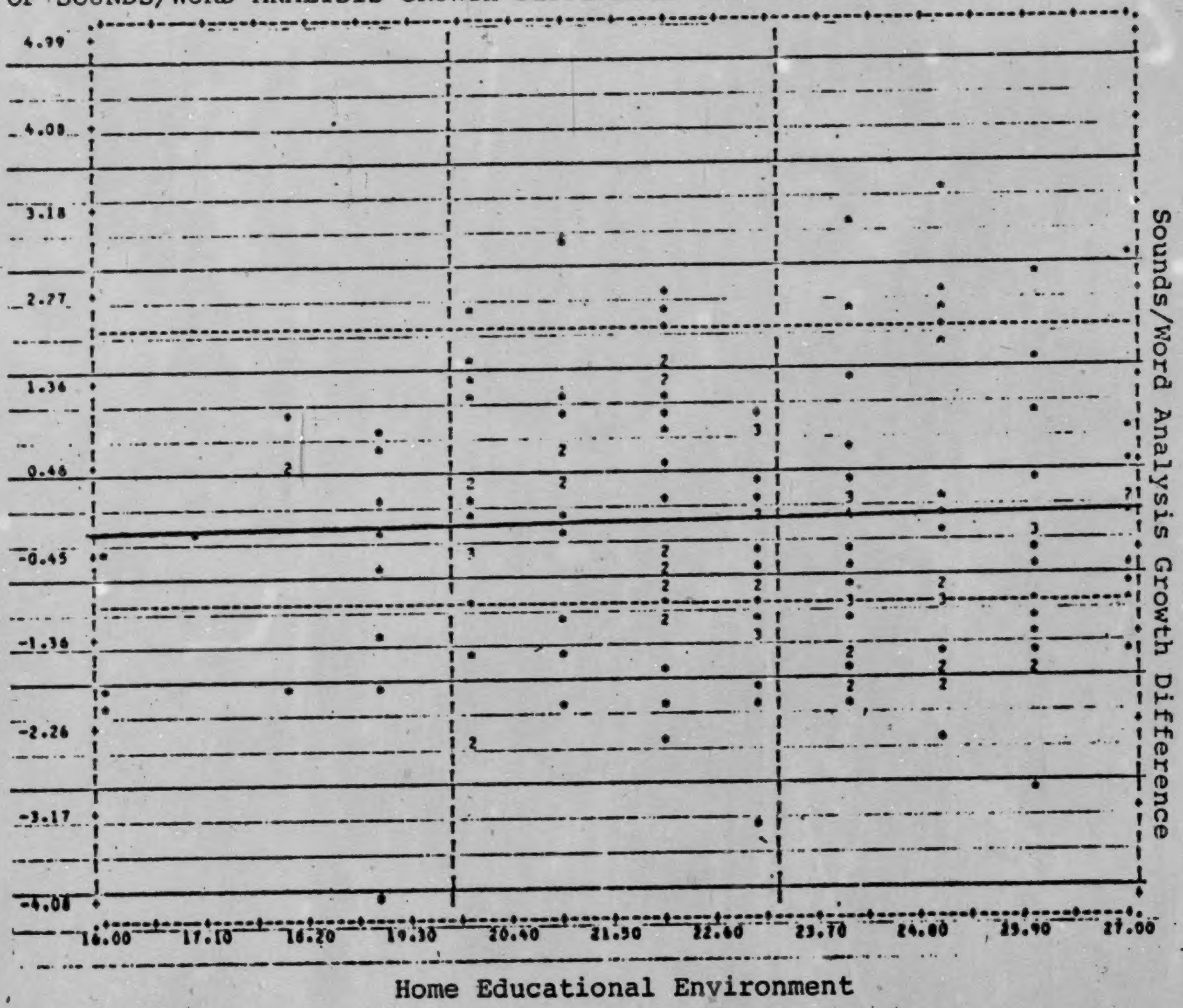


FIGURE 10

SCATTERPLOT OF MATH GROWTH DIFFERENCE AND INCOME: KINDERGARTEN (N=252)

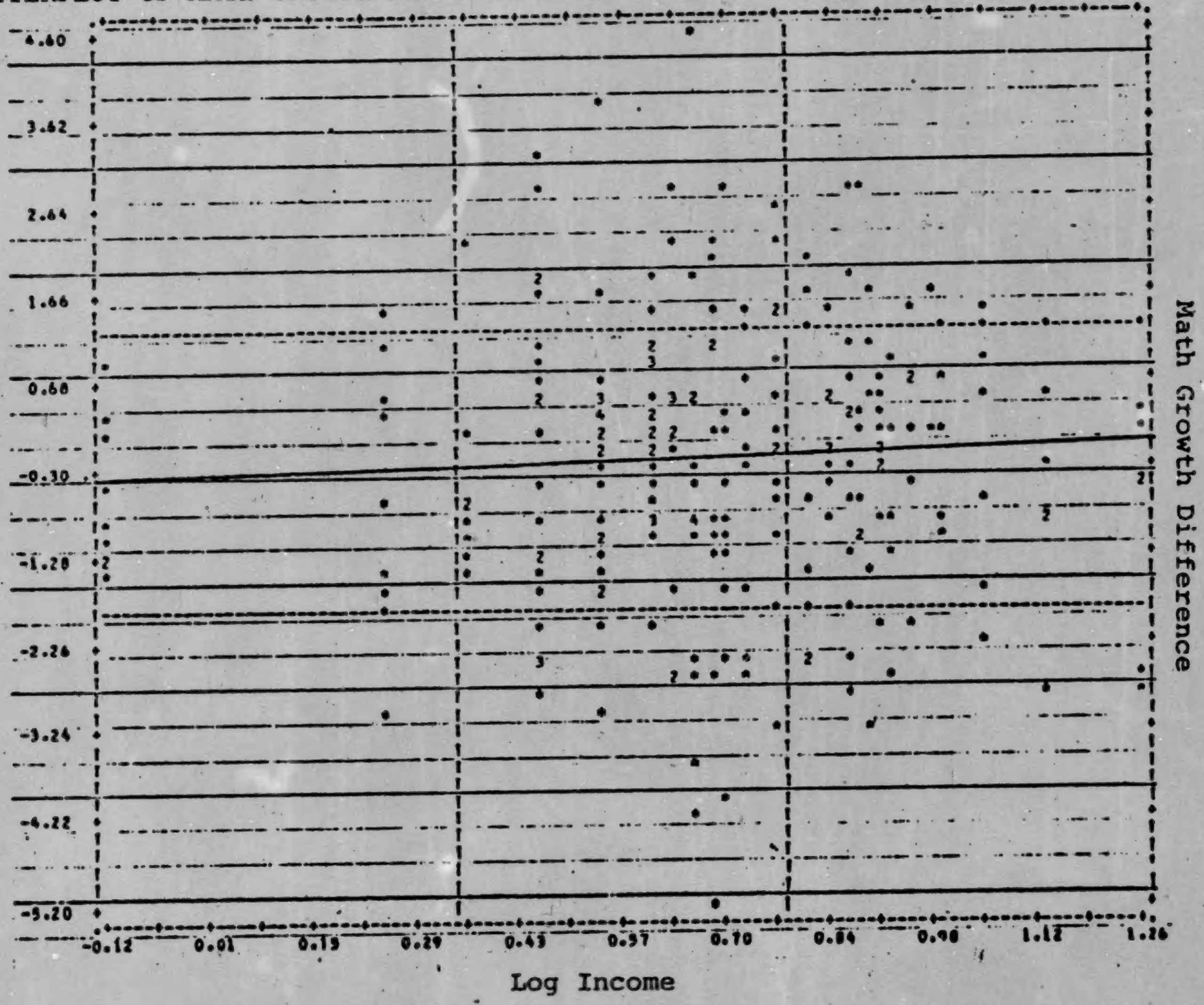


FIGURE 11

SCATTERPLOT OF MATH GROWTH DIFFERENCE AND HOME EDUCATIONAL ENVIRONMENT: KINDERGARTEN (N=15

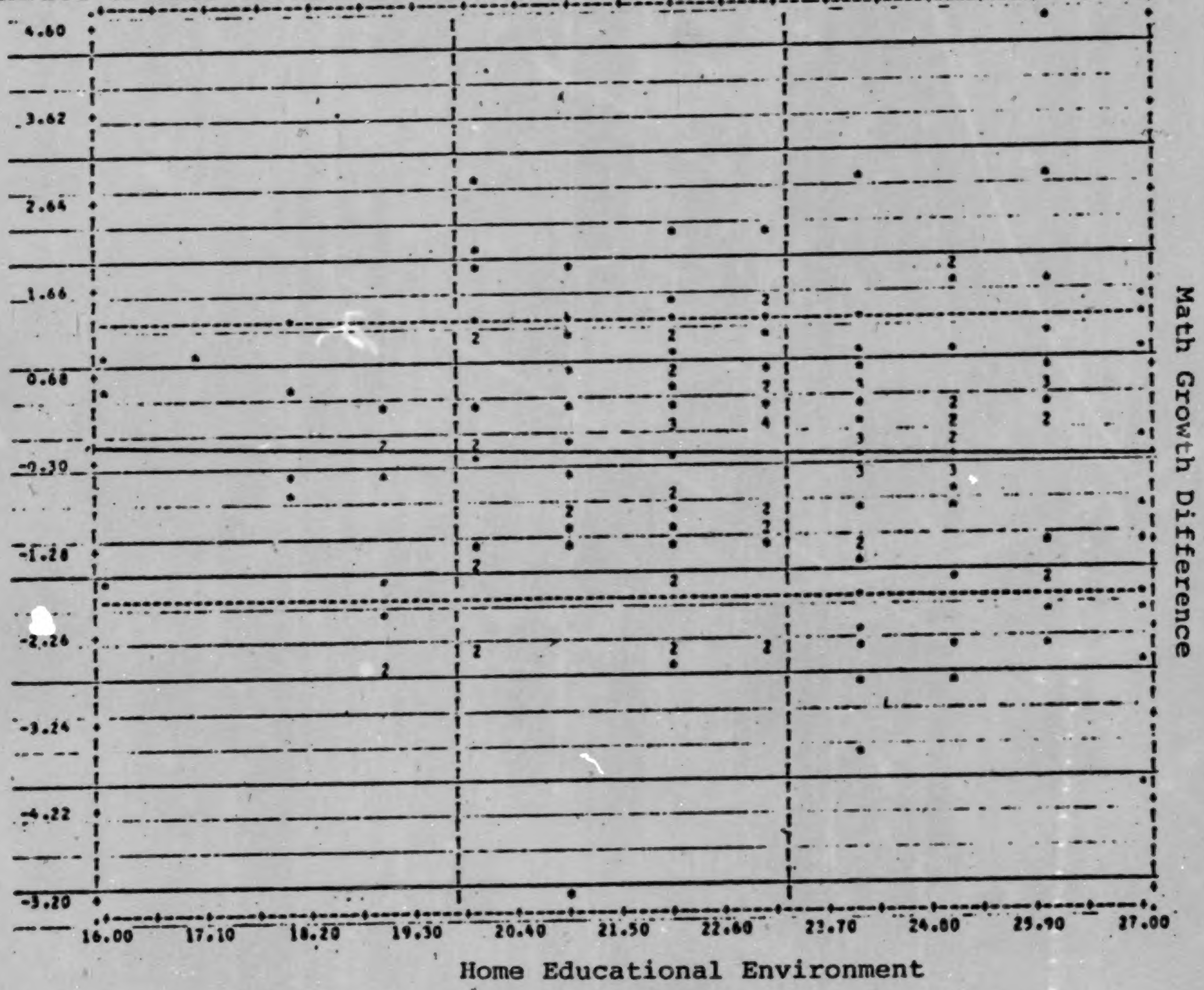


FIGURE 12

SCATTERPLOT OF READING GROWTH DIFFERENCE AND HOME EDUCATIONAL ENVIRONMENT: FIRST GRADE (N=22

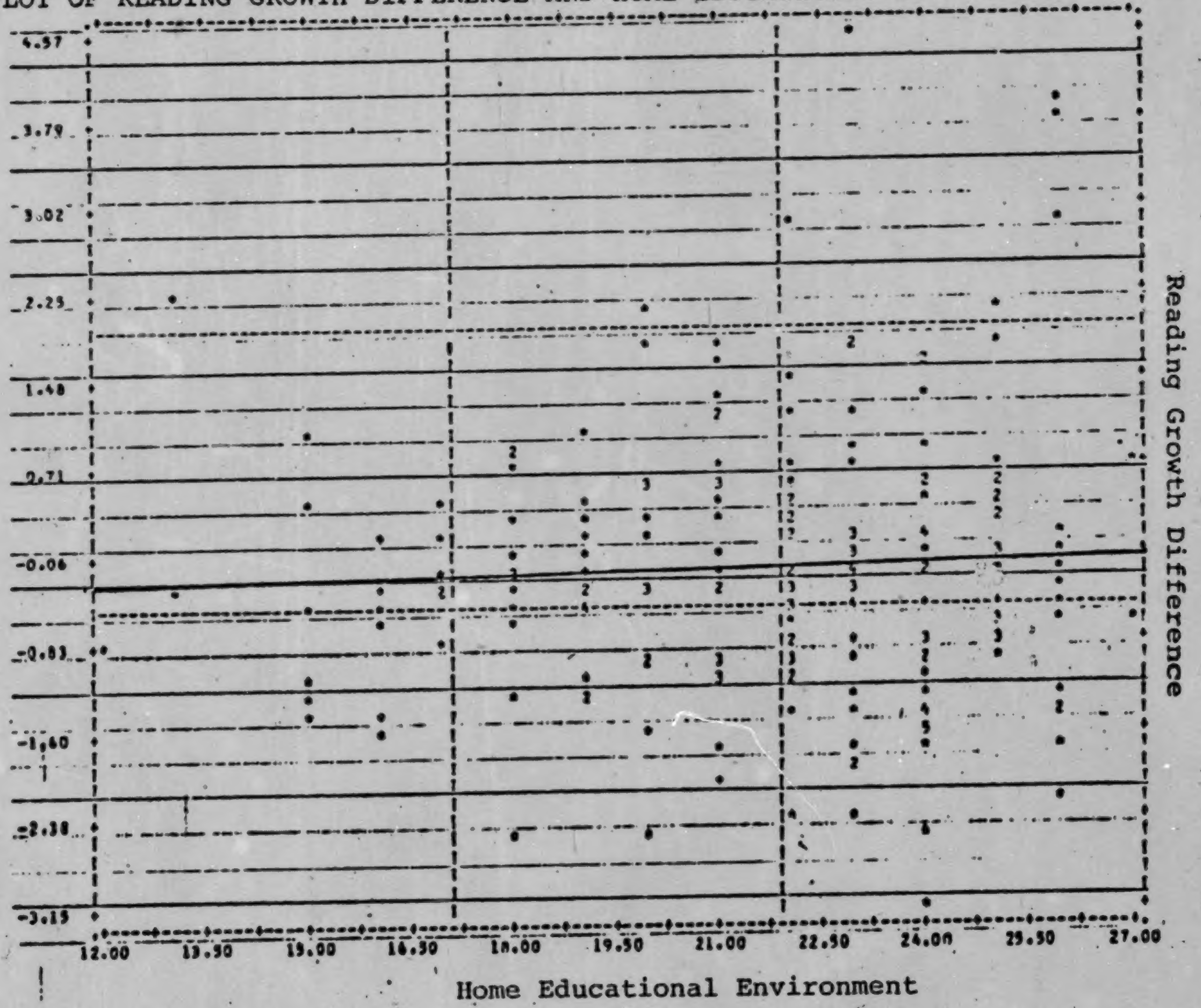


FIGURE 13

SCATTERPLOT OF MATH GROWTH DIFFERENCE AND HOME EDUCATIONAL ENVIRONMENT: FIRST GRADE (N=220)

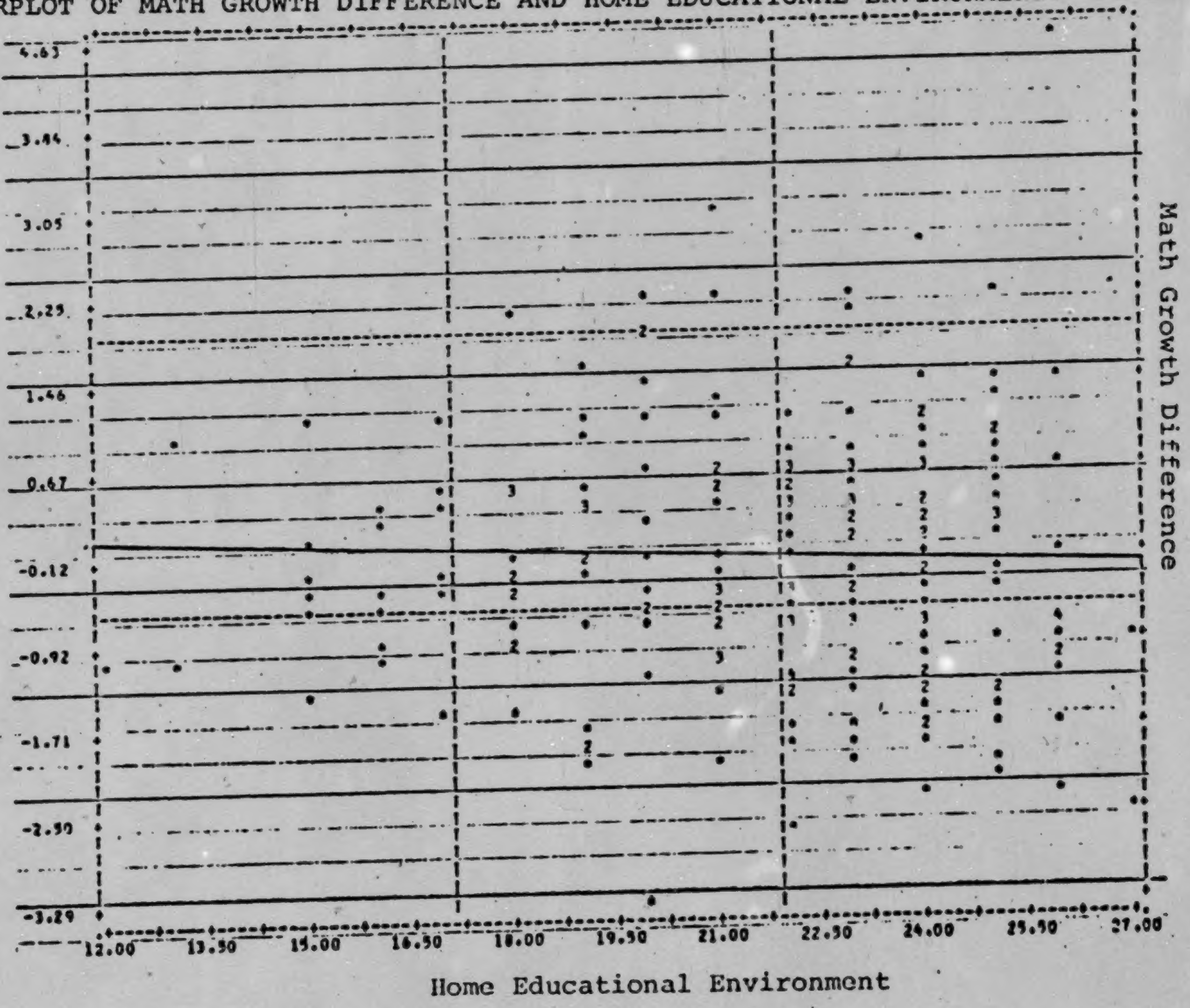


FIGURE 14

SCATTERPLOT OF READING GROWTH DIFFERENCE AND INCOME: SECOND GRADE (N=273)

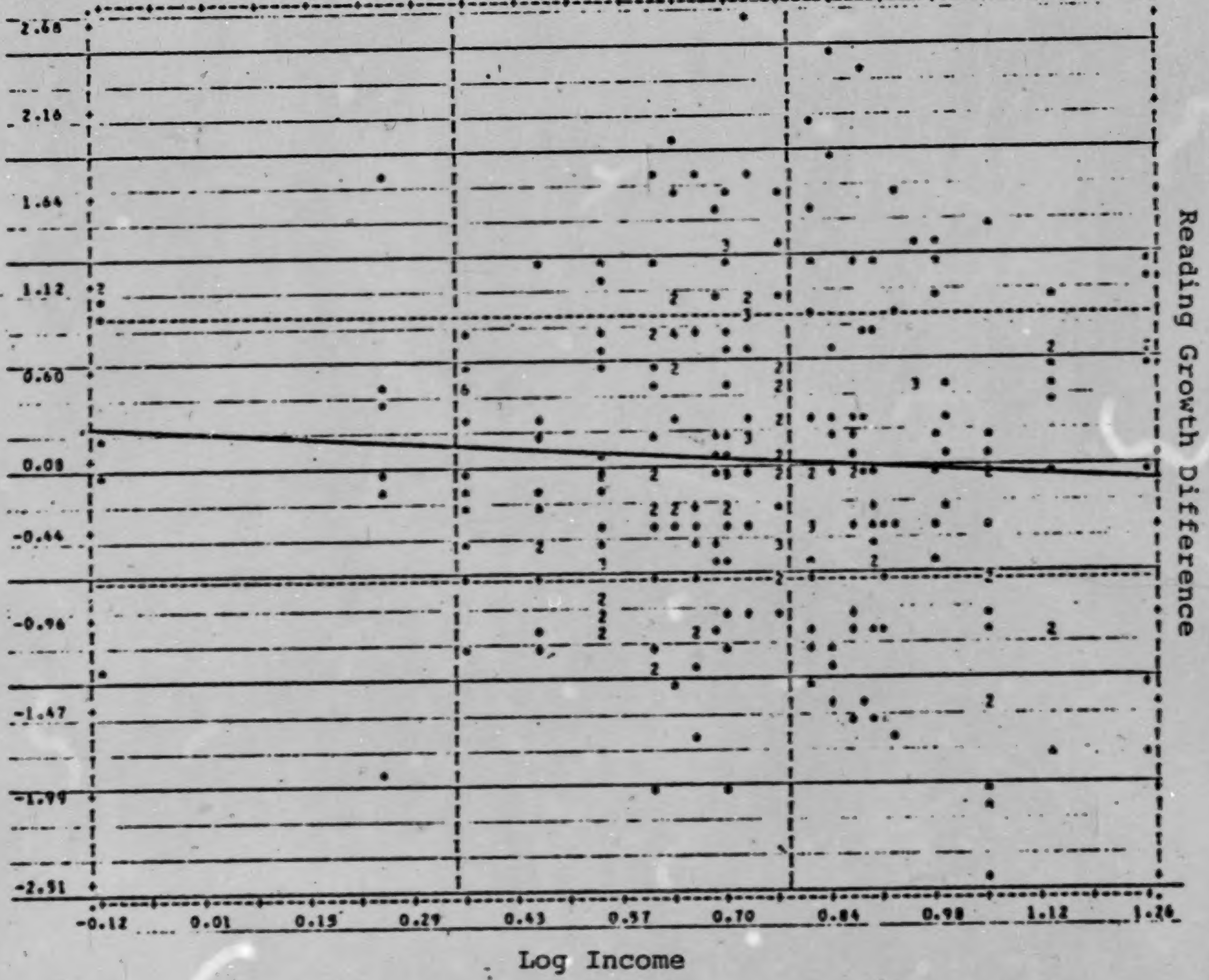


FIGURE 15

SCATTERPLOT OF READING GROWTH DIFFERENCE AND HOME EDUCATIONAL ENVIRONMENT: SECOND GRADE (N=222)

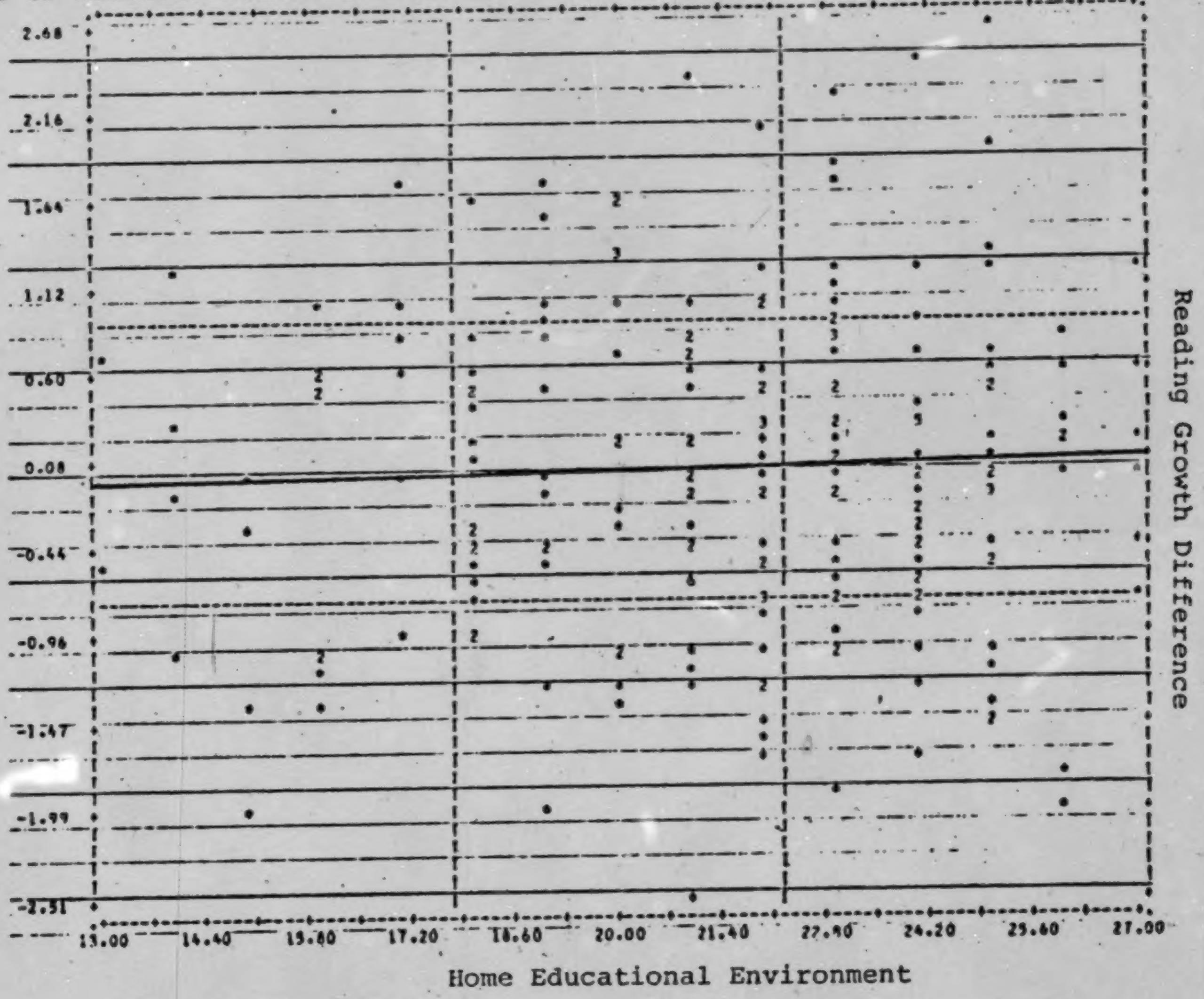


FIGURE 16

SCATTERPLOT OF SPELLING GROWTH DIFFERENCE AND HOME EDUCATIONAL ENVIRONMENT: SECOND GRADE (N=222)

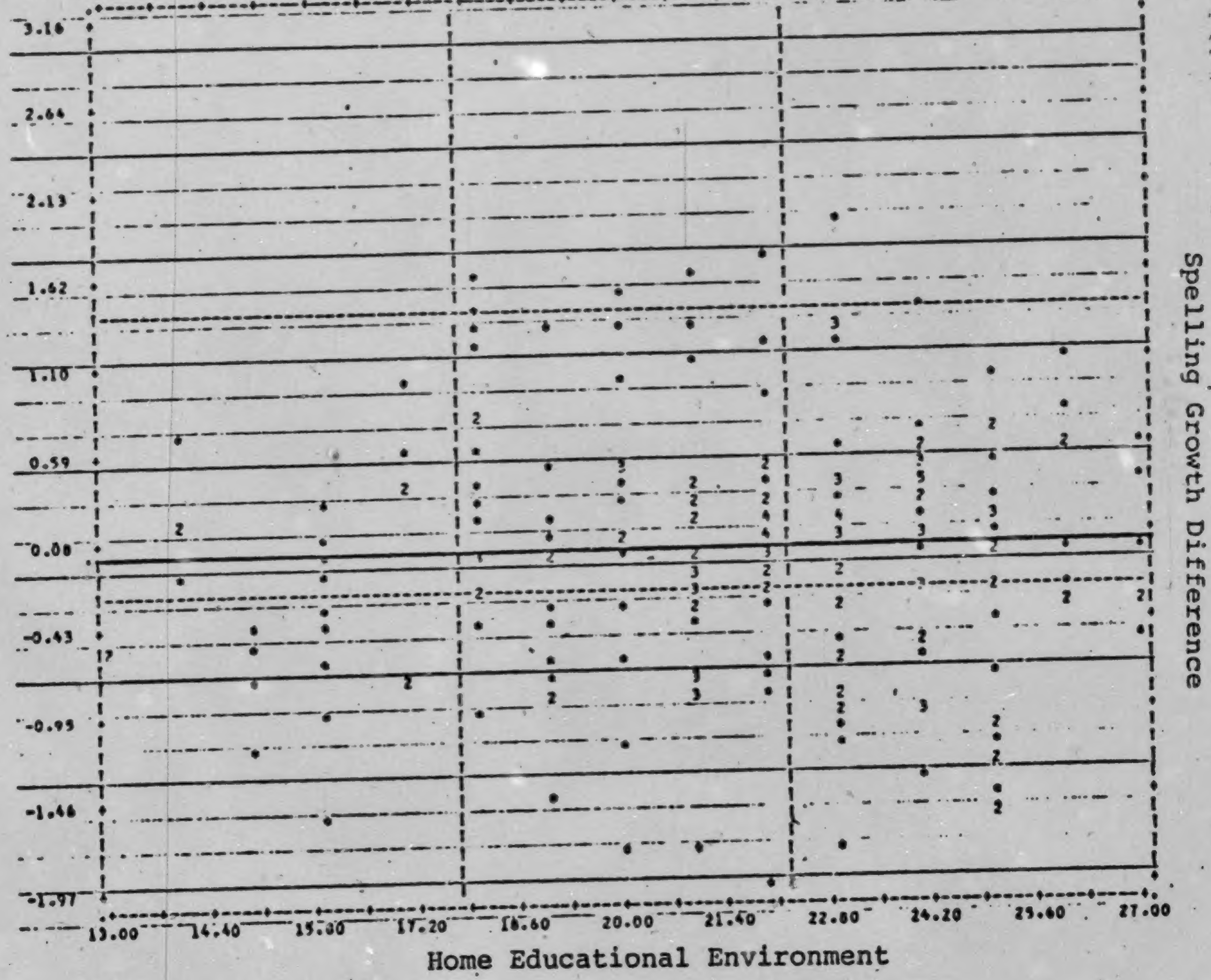


FIGURE 17

SCATTERPLOT OF MATH GROWTH DIFFERENCE AND INCOME: SECOND GRADE (N=273)

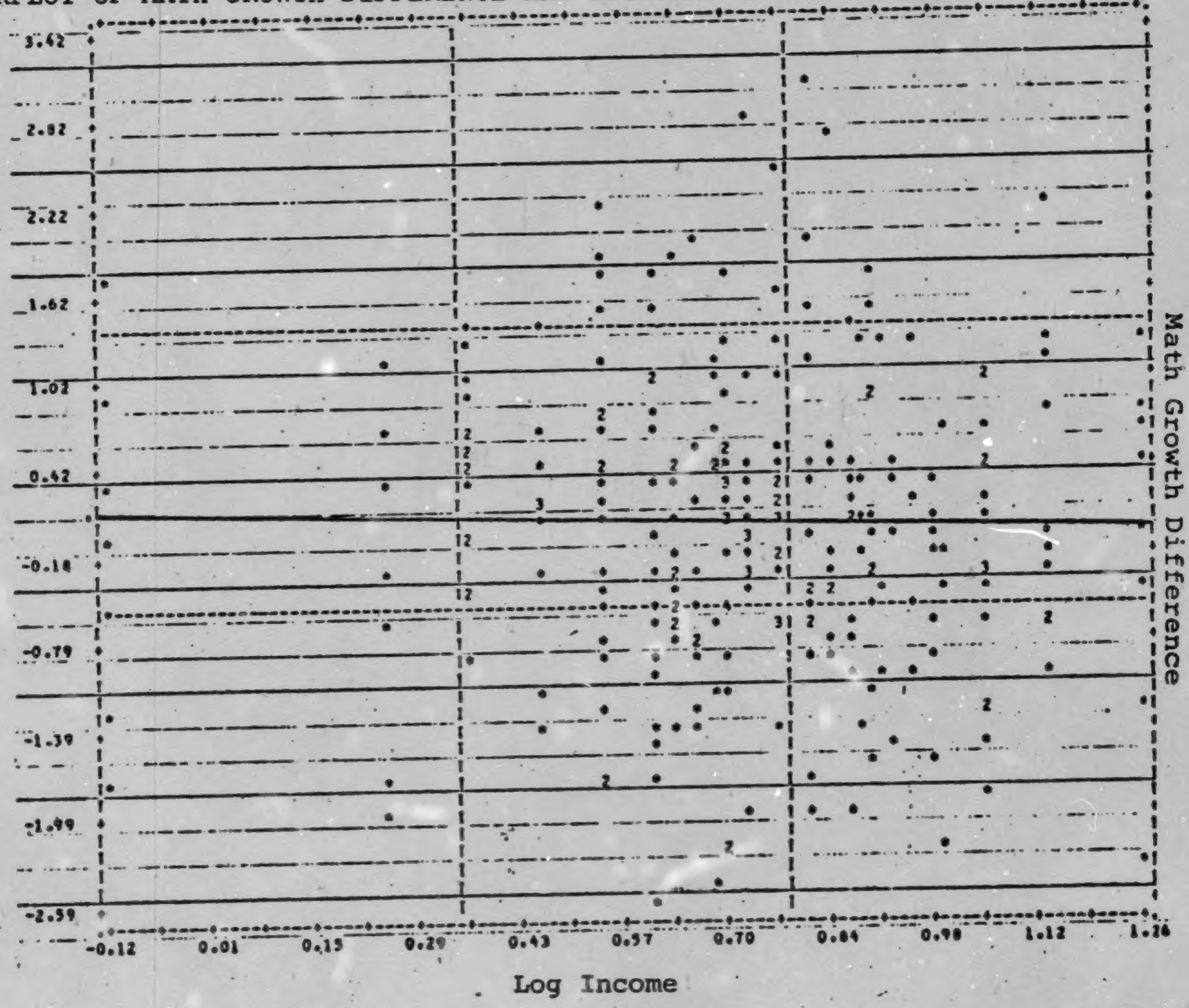
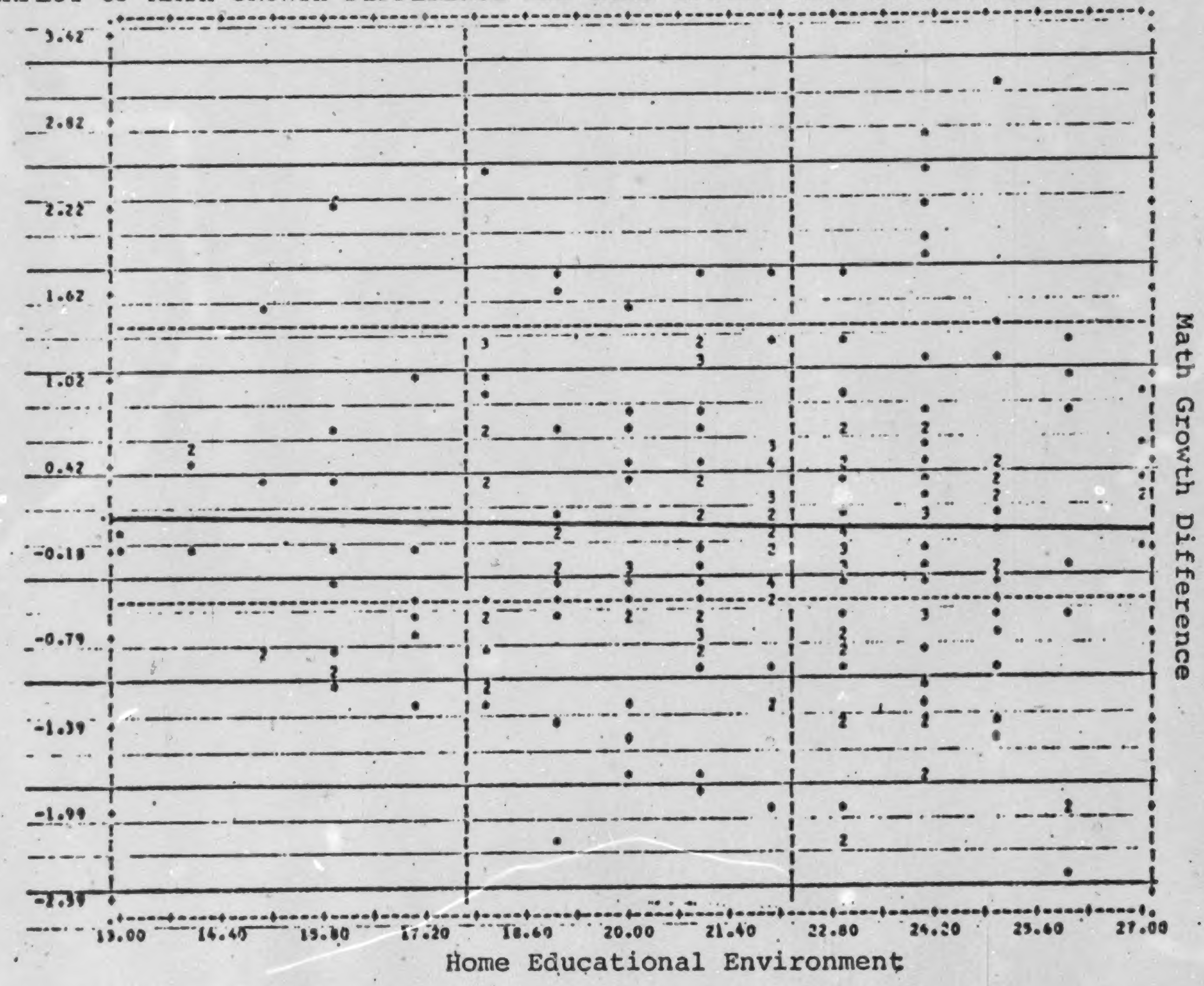


FIGURE 18

SCATTERPLOT OF MATH GROWTH DIFFERENCE AND HOME EDUCATIONAL ENVIRONMENT: SECOND GRADE (N=222)



APPENDIX C

VARIABLES USED IN SUBGROUP ANALYSIS, CHAPTER IV

APPENDIX C

VARIABLES USED IN SUBGROUP ANALYSIS, CHAPTER IV

The eight variables used in the subgroup analysis come from items on the Follow Through Parent Interview (1972). The original item number is referenced along with a description of how the variable was coded for this analysis. For each subgroup, only subjects with valid responses on the relevant items were included.

1) Mothers Education: This variable is based on item #77 in the Parent Interview. The eight categories were recoded so that each category was represented by the number of years of education (the middle value of the category). The two subgroups were defined by a) values less than 12 years and b) values equal to or greater than 12 years.

2) Head of Household: Item #12 records the relationship of the head of the household to the child. For this analysis only the categories of mother and father were included.

3) Home Ownership: Item #72 asks if the house/apartment is rented or owned. These form the two categories for this variable.

4) Have Books: Item #29 asks if there are any books at home that the child reads on his own, other than school books. "Yes" and "no" responses from the two categories

for this variable.

5) Read Outloud: Item #30 asks if the child ever reads out loud to someone at home. "Yes" and "no" responses form the two categories.

6) Is Read To: Item #32 asks if someone at home ever reads to the child. Again, the two categories are formed by "yes" and "no" responses.

7) Sesame Street and 8) Electric Company

These two variables are from items #68 and #69, respectively, which ask whether the child watches the program when not in school. Responses of "yes" and "no" make up the two subgroups.

APPENDIX D

POVERTY CLASSIFICATION

APPENDIX D

POVERTY CLASSIFICATION

The distinction between "poor" and "non-poor" is defined by the poverty range used by SRI and NORC--an adaptation of the OEO poverty guidelines which consider income, household size, and whether the region is urban or rural. Since these data are all from Philadelphia, the urban figures were used. Below are the cut-off figures which determine poverty classification. For each size of household, if the total household income is equal to or less than the figure given, the household is classified as poverty.

Household Size	Income	Household Size	Income
2	3,200	9	7,200
3	3,800	10	7,700
4	4,200	11	8,700
5	4,700	12	9,200
6	5,700	13	9,800
7	6,200	14-17	12,000
8	6,800	18-22	15,000

APPENDIX E

FACTOR ANALYSIS ITEMS AND WEIGHTS

APPENDIX E

FACTOR ANALYSIS ITEMS AND WEIGHTS

The HEE and SES composites in the regression equations in Chapter IV were formed from a principal components analysis. For each of the three samples (grade levels), this analysis was done on eight HEE items and seven SES items. The composites were formed by summing the products of the first principal component weights and the values of the variables (standardized on each sample). Below is a list of the variables included, the Parent Interview items from which they were derived, and the weights for each sample.

Variable	P.I. Item	Weights		
		Kindergarten	First	Second
HEE				
Help on school work	25	.105	.090	.105
Talk about class	26	.441	.581	.498
How often reads	29	.696	.728	.714
How often reads outloud	30	.615	.745	.640
Chooses to read	31	.651	.730	.704
Reads to child	32	.573	.383	.454
Watches Sesame Street	68	.475	.176	.241
Watches Electric Company	69	.480	.195	.205
SES				
Household size	11	.370	-.001	.083
Rent/own home	72	.671	.613	.712
Length of residence	73	.610	.487	.524
Mothers education	77	.143	.508	.440
Income	79	.757	.717	.747
Mothers occupation	76	.032	.527	.199
Head of household	12	.555	.610	.653

APPENDIX F

ANALYSES BY CURRICULUM MODEL

APPENDIX F

ANALYSES BY CURRICULUM MODEL

In order to look for relationships between curriculum models and the findings in the Philadelphia study, the analyses presented in Chapters IV, V, and VI were repeated broken down into four groups: the three Follow Through models represented (Bank Street College of Education, Support and Development Center for Follow Through at the University of Kansas, and Educational Development Corporations (EDC) and the non-Follow Through group. Bank Street and EDC represent open classroom approaches. Bank Street emphasizes both social emotional and academic development as intertwined domains. Teaching rests on relating and expanding upon each child's response to varied experiences. EDC's open classroom approach is derived from the British primary school model and theories of child development. Academic skills are developed in a self-directed way through classroom experiences. The University of Kansas model is a behavior analysis approach which emphasizes academic skills through use of individualized programmed materials. It makes use of systematic positive reinforcement in the form of a token exchange system. The non-Follow Through group is presumed to reflect the traditional elementary school curriculum. More detailed descriptions of the Follow Through models are obtainable from the Follow Through Branch of the U.S. Office of

Education.

The following tables present the findings by model for each of the analyses reported in Chapters IV-VI. The chart below lists each table, the number of the original table (over all groups), and the expectation associated with each analysis. Because no patterns emerged clearly, the results are merely presented without discussion.

Table #	Based on Table #	Expectation
27	7 (p. 45)	significant negative correlations
28-30	8-10 (pp. 56-58)	larger value for the lower group (A) in each pair of Growth Difference scores
31, 32	11, 12 (pp. 65, 66)	larger increase in Poor/Non-Poor difference over the summer (S72 to F72) than over the school year (F72 to S73)
33, 34	13, 14 (pp. 71, 72)	larger background measure coefficient in the first equation of each pair of equations (predicting the end of summer score)

TABLE 27

Table 7 (p. 45) Broken Down by Model:
Correlations between Growth Difference and a) Log Income and b) an Index of Home Educational Environment (HEE)

KINDERGARTEN		n	Reading	Sounds	Math
Bank Street	Income	50	.16	.06	.27**
	HEE	27	-.31*	.08	-.12
Kansas	Income	66	.06	-.14	-.08
	HEE	46	-.10	-.11	-.18
EDC	Income	58	.07	-.06	.14
	HEE	34	-.16	.04	-.42***
NFT	Income	78	.27***	.17*	.01
	HEE	50	.04	.03	.15

FIRST GRADE		n	Word An.	Reading	Math
Bank Street	Income	60	-.34***	.06	.08
	HEE	48	-.15	.03	-.08
Kansas	Income	69	-.12	-.11	-.15
	HEE	47	-.18	-.20*	-.01
EDC	Income	66	.10	-.21**	-.16
	HEE	48	-.18	-.11	.28**
NFT	Income	99	-.15*	-.20**	-.24***
	HEE	75	.02	.19*	.09

SECOND GRADE		n	Reading	Spelling	Math
Bank Street	Income	70	-.17*	.05	-.01
	HEE	47	-.11	-.15	-.23*
Kansas	Income	49	.08	-.12	-.02
	HEE	44	.05	-.03	.02
EDC	Income	61	-.14	-.07	.11
	HEE	52	.26**	-.00	.11
NFT	Income	93	-.07	-.30***	-.06
	HEE	79	-.08	.08	-.01

* $p < .10$ ** $p < .05$ *** $p < .01$

TABLE 28

Table 8 (p. 56) Broken Down by Model:
Growth Difference Scores for High and Low Groups on Eight Background Measures for 3 Sets of Tests (A=Low, B=High) for Kindergarten

BANK STREET

Background Variables			n	Sounds	Reading	Math
					TESTS	
Mothers Education	A.	< H.S.*	31	.283	.149	.647
	B.	> H.S.**	17	.173	-.326	.317
Head of Household	A.	Mom	28	.364	-.014	.114
	B.	Pop	16	.207	.169	1.129
Home	A.	Rented	46	.209	-.143	.388
	B.	Owned	7	.723	1.078	1.297
Have Books	A.	No	12	1.091	.710	.786
	B.	Yes	33	-.080	-.063	.534
Reads Out Loud	A.	No	10	.883	.975	.854
	B.	Yes	34	.054	-.131	.571
Is Read To	A.	No	2	1.780	.391	.868
	B.	Yes	51	.218	.004	.494
Watches Sesame St.	A.	No	6	.669	-.328	.113
	B.	Yes	47	.223	.063	.558
Watches Electric Co.	A.	No	16	.681	-.438	.464
	B.	Yes	37	.102	.216	.527

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* Less than High School
** More than High School

cont'd

Table 28 (continued)

KANSAS

Background Variables			n	TESTS Sounds	 Reading	 Math
Mothers Education	A.	< H.S.*	33	-.461	.439	-1.049
	B.	> H.S.**	23	-.444	.320	-1.369
Head of Household	A.	Mom	27	-.278	.442	-1.327
	B.	Pop	23	-.614	.273	-.899
Home	A.	Rented	48	.232	.349	-1.182
	B.	Owned	21	-.793	-.254	-1.071
Have Books	A.	No	11	.105	.642	-1.280
	B.	Yes	56	-.515	.109	-1.084
Reads Out Loud	A.	No	15	-.102	.493	-1.590
	B.	Yes	52	-.502	.111	-.979
Is Read To	A.	No	2	-.779	-.549	-1.200
	B.	Yes	67	-.392	.187	-1.147
Watches Sesame St.	A.	No	6	-.463	-.339	-.550
	B.	Yes	63	-.397	.214	-1.206
Watches Electric Co.	A.	No	27	-.152	-.203	-1.645
	B.	Yes	42	-.564	.403	-.829

---

* Less than High School
** More than High School

cont'd

Table 28 (continued)

EDC

					TESTS	
Background Variables			n	Sounds	Reading	Math
Mothers Education	A.	< H.S.*	28	.056	.082	-.102
	B.	> H.S.**	32	.208	.242	.261
Head of Household	A.	Mom	27	.355	.212	.275
	B.	Pop	29	.031	.119	.036
Home	A.	Rented	38	-.050	.107	.138
	B.	Owned	26	.332	.023	.007
Have Books	A.	No	9	.443	.419	-.043
	B.	Yes	45	-.135	-.142	.022
Reads Out Loud	A.	No	7	.061	.206	.863
	B.	Yes	40	-.007	.004	.010
Is Read To	A.	No	4	1.469	.657	-.445
	B.	Yes	60	.014	.034	.120
Watches Sesame St.	A.	No	2	-.500	-.730	-.441
	B.	Yes	60	.141	.188	.123
Watches Electric Co.	A.	No	16	.141	-.101	.474
	B.	Yes	47	.092	.169	-.020

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* Less than High School
** More than High School

cont'd

Table 28 (continued)

			NFT		TESTS	
Background Variables			n	Sounds	Reading	Math
Mothers Education	A.	< H.S.*	36	-.357	-.273	-.039
	B.	> H.S.**	41	.175	-.151	.055
Head of Household	A.	Mom	33	-.441	-.316	-.114
	B.	Pop	31	.269	.020	.150
Home	A.	Rented	47	-.307	-.326	.023
	B.	Owned	34	.070	-.161	-.202
Have Books	A.	No	12	.096	-.581	-.287
	B.	Yes	60	-.074	-.199	-.049
Reads Out Loud	A.	No	13	-.289	-.227	-.712
	B.	Yes	58	.012	-.225	.046
Is Read To	A.	No	6	.026	-.868	-.580
	B.	Yes	76	-.123	-.195	-.013
Watches Sesame St.	A.	No	7	.365	-.638	-.144
	B.	Yes	75	-.157	-.208	-.046
Watches Electric Co.	A.	No	28	.161	-.182	-.028
	B.	Yes	54	-.254	-.276	-.068

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* Less than High School

** More than High School

TABLE 29

Table 9 (p. 57) Broken Down by Model:
Growth Difference Scores for High and Low Groups on Eight Background Measures for 3 Sets of Tests (A=Low, B=High) for First Grade

BANK STREET

Background Variables			n	Word Analysis	Reading	Math
Mothers Education	A.	< H.S.*	34	.067	-.159	.196
	B.	> H.S.**	22	-.224	-.385	.336
Head of Household	A.	Mom	30	.010	-.188	.194
	B.	Pop	21	-.102	-.255	.489
Home	A.	Rented	46	.026	-.232	.197
	B.	Owned	14	-.202	-.288	.497
Have Books	A.	No	7	-.257	-.319	.335
	B.	Yes	53	-.019	-.225	.291
Reads Out Loud	A.	No	3	.739	-.074	.260
	B.	Yes	57	-.088	-.245	.298
Is Read To	A.	No	3	-.605	-1.403	-.394
	B.	Yes	58	-.013	-.183	.308
Watches Sesame St.	A.	No	5	.084	-.308	.071
	B.	Yes	54	-.037	-.240	.274
Watches Electric Co.	A.	No	22	-.187	.090	.614
	B.	Yes	37	.066	-.455	.039

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* Less than High School
** More than High School

cont'd

Table 29 (continued)

KANSAS

				TESTS		
Background Variables			n	Word Analysis	Reading	Math
Mothers Education	A.	< H.S.*	41	-.121	.198	.016
	B.	> H.S.**	27	.211	-.124	-.059
Head of Household	A.	Mom	39	.082	.214	.230
	B.	Pop	20	.149	-.026	-.284
Home	A.	Rented	62	-.042	.152	.064
	B.	Owned	13	.224	-.208	.089
Have Books	A.	No	11	-.050	.224	.075
	B.	Yes	62	.043	.058	.084
Reads Out Loud	A.	No	16	.450	.759	.049
	B.	Yes	57	-.090	-.107	.092
Is Read To	A.	No	5	-.429	.311	.037
	B.	Yes	70	.035	.073	.070
Watches Sesame St.	A.	No	12	.099	.003	.365
	B.	Yes	63	-.014	.106	.012
Watches Electric Co.	A.	No	28	-.086	.401	.135
	B.	Yes	47	.058	-.097	.028

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* Less than High School
** More than High School

cont'd

Table 29 (continued)

EDC

			TESTS		
Background Variables		n	Word Analysis	Reading	Math
Mothers Education	A. < H.S.*	33	-.320	-.496	-.346
	B. > H.S.**	31	.052	-.541	-.479
Head of Household	A. Mom	32	-.124	-.351	-.249
	B. Pop	27	-.249	-.641	-.635
Home	A. Rented	41	-.261	-.597	-.466
	B. Owned	27	.170	-.303	-.317
Have Books	A. No	11	-.019	-.435	.035
	B. Yes	57	-.145	-.503	-.485
Reads Out Loud	A. No	7	-1.210	-.606	-.682
	B. Yes	59	.006	-.475	-.357
Is Read To	A. No	4	.736	-.465	-.958
	B. Yes	65	-.158	-.492	-.384
Watches *Sesame St.*	A. No	7	.522	-.630	-.494
	B. Yes	62	-.177	-.475	-.409
Watches *Electric Co.*	A. No	19	-.255	-.468	-.316
	B. Yes	49	-.038	-.512	-.441

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* Less than High School
** More than High School

cont'd

Table 29 (continued)

NFT

Background Variables			n	TESTS Word Analysis	Reading	Math
Mothers Education	A.	< H.S.*	50	.224	.518	.120
	B.	> H.S.**	48	-.042	-.234	-.542
Head of Household	A.	Mom	58	.159	.360	.102
	B.	Pop	38	.043	-.063	-.566
Home	A.	Rented	71	.205	.453	.048
	B.	Owned	29	-.067	-.430	-.765
Have Books	A.	No	15	.176	.622	-.115
	B.	Yes	85	.077	.098	-.265
Reads Out Loud	A.	No	8	.042	.698	.630
	B.	Yes	92	.096	.131	-.318
Is Read To	A.	No	8	.325	.255	.140
	B.	Yes	95	.101	.171	-.244
Watches Sesame St.	A.	No	15	.005	-.078	-.117
	B.	Yes	88	.138	.222	-.231
Watches Electric Co.	A.	No	35	.115	-.090	-.246
	B.	Yes	67	.121	.335	-.199

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* Less than High School

** More than High School

TABLE 30

Table 10 (p. 58) Broken Down by Model:
Growth Difference Scores for High and Low Groups on Eight Background Measures for 3 Sets of Tests (A=Low, B=High) for Second Grade

BANK STREET

				TESTS		
Background Variables			n	Reading	Spelling	Math
Mothers Education	A.	< H.S.*	46	-.090	-.161	.179
	B.	> H.S.**	23	.023	-.093	.566
Head of Household	A.	Mom	43	.004	-.201	.178
	B.	Pop	21	-.200	-.106	.594
Home	A.	Rented	59	.014	-.102	.340
	B.	Owned	13	-.344	-.272	.149
Have Books	A.	No	10	-.087	-.004	.847
	B.	Yes	62	-.045	-.153	.218
Reads Out Loud	A.	No	10	-.174	-.227	.289
	B.	Yes	62	-.031	-.117	.308
Is Read To	A.	No	10	-.032	-.328	-.383
	B.	Yes	62	-.053	-.101	.417
Watches Sesame St.	A.	No	8	.347	.153	1.230
	B.	Yes	64	-.100	-.168	.190
Watches Electric Co.	A.	No	28	-.152	-.022	.188
	B.	Yes	44	.014	-.203	.380

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* Less than High School
** More than High School

cont'd

Table 30 (continued)

KANSAS

Background Variables			n	Reading	Spelling	Math
					TESTS	
Mothers Education	A.	< H.S.*	25	.313	.288	-.065
	B.	> H.S.**	20	.117	-.222	.126
Head of Household	A.	Mom	28	-.025	.066	-.203
	B.	Pop	15	.620	-.043	.592
Home	A.	Rented	40	.086	-.079	-.024
	B.	Owned	13	.931	.472	.646
Have Books	A.	No	3	1.314	.042	1.249
	B.	Yes	49	.195	.045	.020
Reads Out Loud	A.	No	1	-1.619	-.119	.301
	B.	Yes	51	.297	.048	.087
Is Read To	A.	No	6	1.006	.103	.511
	B.	Yes	47	.202	.050	.093
Watches Sesame St.	A.	No	3	-.044	-1.023	-.697
	B.	Yes	50	.313	.121	.190
Watches Electric Co.	A.	No	15	.208	-.066	.551
	B.	Yes	37	.340	.067	-.042

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* Less than High School
** More than High School

cont'd

Table 30 (continued)

EDC

				TESTS		
Background Variables			n	Reading	Spelling	Math
Mothers Education	A.	< H.S.*	27	.457	.297	.045
	B.	> H.S.**	38	-.048	-.052	-.100
Head of Household	A.	Mom	25	.153	.246	-.234
	B.	Pop	37	.077	-.034	.092
Home	A.	Rented	33	.178	-.052	-.011
	B.	Owned	34	.168	.203	-.092
Have Books	A.	No	4	.194	.584	.660
	B.	Yes	61	.199	.040	-.078
Reads Out Loud	A.	No	4	.537	-.084	-.141
	B.	Yes	61	.177	.084	-.025
Is Read To	A.	No	5	.362	.301	.455
	B.	Yes	62	.158	.059	-.093
Watches Sesame St.	A.	No	11	.192	-.012	-.089
	B.	Yes	56	.169	.095	-.045
Watches Electric Co.	A.	No	15	.331	-.040	.216
	B.	Yes	51	.085	.074	-.129

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* Less than High School
** More than High School

cont'd

Table 30 (continued)

			NFT		TESTS	
Background Variables			n	Reading	Spelling	Math
Mothers Education	A.	< H.S.*	45	.120	.380	-.083
	B.	> H.S.**	53	-.192	-.147	-.244
Head of Household	A.	Mom	49	-.080	.250	-.163
	B.	Pop	43	-.107	.018	-.197
Home	A.	Rented	68	.075	.287	-.125
	B.	Owned	33	-.368	-.209	-.262
Have Books	A.	No	13	.046	.194	.047
	B.	Yes	90	-.049	.097	-.186
Reads Out Loud	A.	No	8	.010	.135	-.092
	B.	Yes	95	-.041	.107	-.162
Is Read To	A.	No	11	-.338	.235	-.246
	B.	Yes	92	-.001	.095	-.146
Watches Sesame St.	A.	No	13	.011	.035	-.336
	BB.	Yes	89	-.038	.115	-.126
Watches Electric Co.	A.	No	35	-.056	.227	-.253
	B.	Yes	63	-.004	-.008	-.113

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* Less than High School
** More than High School

TABLE 31

Table 11(p. 65) Broken Down by Model:
Standardized Scores by Subtest and Time of Testing for Poor (P) and Non-Poor (NP) Children and their Difference (D=NP-P)

		BANK STREET			KANSAS		
		P	NP	D	P	NP	D
KINDERGARTEN	n	35	15		40	26	
S'72 Sounds		.12	.39	.27	.19	.30	.11
F'72 Sounds		-.14	.24	.38	.52	.74	.22
S'73 Word Analysis		-.10	.24	.34	.46	.73	.27
S'72 Reading		-.30	.54	.84	.39	.57	.18
F'72 Reading		-.25	.20	.45	.42	.38	-.04
S'73 Reading		-.18	.06	.24	.50	.67	.17
S'72 Numbers		-.21	.72	.93	.63	.73	.10
F'72 Numbers		-.36	.14	.50	1.05	1.30	.25
S'73 Math		-.09	.45	.54	.41	.60	.19
FIRST GRADE	n	33	25		49	19	
S'72 Word Analysis		-.01	-.17	-.16	.29	.84	.55
F'72 Word Analysis		.02	.01	-.01	.11	.83	.72
S'73 Word Analysis		.18	-.07	-.25	-.08	.79	.87
S'72 Reading		-.04	-.08	-.04	.07	.74	.67
F'72 Reading		.15	.02	-.13	-.04	.84	.88
S'73 Reading		-.01	.08	.09	-.06	.84	.90
S'72 Math		-.13	-.03	.10	.20	.83	.63
F'72 Math		.01	-.24	-.25	.12	.94	.82
S'73 Math		.38	-.07	-.45	.07	1.11	1.04
SECOND GRADE	n	49	21		33	16	
S'72 Reading		-.14	.47	.61	.09	.61	.52
F'72 Reading		-.21	.19	.40	.09	.46	.37
S'73 Reading		-.31	-.09	.22	.28	.97	.69
S'72 Spelling		-.20	.23	.43	.14	.63	.49
F'72 Spelling		-.20	.32	.52	.09	.75	.66
S'73 Spelling		-.33	.25	.58	.10	.94	.84
S'72 Math		-.06	.34	.40	.04	.70	.66
F'72 Math		-.21	.03	.24	.04	.77	.73
S'73 Math		-.10	.09	.19	.32	.64	.32

cont'd

Table 31 (continued)

		EDC			NFT		
		P	NP	D	P	NP	D
KINDERGARTEN	n	31	27		46	32	
S'72 Sounds		-.51	-.42	.09	-.22	.21	.43
F'72 Sounds		-.53	-.44	.09	-.05	.28	.33
S'73 Word Analysis		-.46	-.23	.23	-.16	.41	.57
S'72 Reading		-.38	-.20	.18	-.00	.45	.45
F'72 Reading		-.29	-.30	-.01	.04	.31	.27
S'73 Reading		-.07	-.15	-.08	-.35	.15	.50
S'72 Numbers		-.37	-.01	.36	-.26	.20	.46
F'72 Numbers		-.30	-.07	.23	-.31	.13	.44
S'73 Math		-.11	.00	.11	-.41	.01	.42
FIRST GRADE	n	30	36		56	42	
S'72 Word Analysis		-.70	-.21	.49	.17	.32	.15
F'72 Word Analysis		-.68	-.19	.49	-.08	.40	.48
S'73 Word Analysis		-.90	-.24	.66	-.04	.46	.50
S'72 Reading		-.40	-.16	.24	.13	.10	-.03
F'72 Reading		-.41	.18	.59	-.16	.23	.39
S'73 Reading		-.69	-.15	.54	-.02	.30	.32
S'72 Math		-.38	.11	.49	.08	-.06	-.14
F'72 Math		-.39	.42	.81	-.19	.33	.52
S'73 Math		-.55	.05	.60	-.23	.05	.28
SECOND GRADE	n	27	34		50	41	
S'72 Reading		-.36	-.23	.13	-.06	.70	.76
F'72 Reading		-.50	-.22	.28	-.11	.92	1.03
S'73 Reading		-.27	-.19	.08	.02	.95	.93
S'72 Spelling		-.49	-.26	.23	.21	.80	.59
F'72 Spelling		-.52	-.21	.31	-.02	.86	.88
S'73 Spelling		-.48	-.15	.33	.16	.80	.64
S'72 Math		-.31	-.15	.16	.01	.46	.45
F'72 Math		-.30	-.25	.05	.08	.70	.62
S'73 Math		-.35	-.40	-.05	.05	.67	.62

TABLE 32

Table 12(p. 66) Broken Down by Model: Difference between Poor/Non-Poor Differences for Summer (Fall 1972 minus Spring 1972) and School Year (Spring 1973 minus Fall 1972) by Grade

	BANK ST.		KANSAS		EDC		NFT	
	Sum*	Sch**	Sum	Sch	Sum	Sch	Sum	Sch
KINDERGARTEN								
Sounds	.11	-.04	.11	.05	.00	.14	-.10	.24
Reading	-.39	-.21	-.22	.21	.19	-.07	-.18	.23
Math	-.43	.04	.15	-.06	-.13	-.12	-.02	-.02
FIRST GRADE								
Wd. Analysis	.15	-.24	.17	.15	.00	.17	.33	.02
Reading	-.09	.22	.21	.02	.25	-.05	.42	-.07
Math	.35	-.20	.19	.22	.32	-.21	.66	-.24
SECOND GRADE								
Reading	-.21	-.18	-.15	.32	.15	-.20	.27	-.10
Spelling	.09	.06	.17	.18	.08	.02	.29	-.24
Math	-.16	-.05	.07	-.41	-.11	-.10	.17	.00

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* Summer
** School Year

TABLE 33

Table 13 (p. 71) Broken Down by Model:
Standardized Regression Coefficients and Total R Squared for Three Pairs of Equations for Each Grade (Test on Prior Test, Income, Household Size, and Mothers Education)

KINDERGARTEN

MODEL	DV	n	PRIOR TEST	INCOME	HHSIZE	MOMED	R^2
Bank St.	F72 Sds	50	.68***S72 Sds	.05	.04	-.03	.50
	S73 WA		.45***F72 Sds	.29*	.10	-.10	.39
Kansas	F72 Sds	72	.59***S72 Sds	.07	.03	.10	.39
	S73 WA		.54***F72 Sds	-.01	-.22	.02	.35
EDC	F72 Sds	64	.37**S72 Sds	.14	-.12	.11	.20
	S73 WA		.36**F72 Sds	.10	-.24*	.28*	.34
NFT	F72 Sds	82	.60***S72 Sds	.04	-.14	-.06	.40
	S73 WA		.60***F72 Sds	.21*	-.02	.17*	.47
Bank St.	F72 Rdg	50	.66***S72 Rdg	-.09	.09	-.04	.45
	S73 Rdg		.51***F72 Rdg	.15	-.01	.03	.29
Kansas	F72 Rdg	72	.67***S72 Rdg	-.12	.01	.07	.46
	S73 Rdg		.19 F72 Rdg	.01	-.12	.03	.06
EDC	F72 Rdg	64	.57***S72 Rdg	-.12	-.10	.13	.43
	S73 Rdg		.14 F72 Rdg	-.07	-.22	.32*	.24
NFT	F72 Rdg	82	.44***S72 Rdg	-.03	-.17	.10	.23
	S73 Rdg		.56***F72 Rdg	.22*	-.00	.08	.40
Bank St.	F72 Nos	50	.78***S72 Nos	-.01	-.08	.11	.55
	S73 Mth		.56***F72 Nos	.26*	.16	.01	.51
Kansas	F72 Nos	72	.54***S72 Nos	.04	.10	.37***	.48
	S73 Mth		.52***F72 Nos	-.04	-.02	-.11	.23
EDC	F72 Nos	64	.46***S72 Nos	-.06	-.14	.08	.28
	S73 Mth		.50***F72 Nos	.11	-.18	.17	.39
NFT	F72 Nos	82	.55***S72 Nos	.14	-.19*	-.04	.39
	S73 Mth		.52***F72 Nos	.12	.05	.13	.32

* p < .05 ** p < .01 *** p < .001 cont'd

Table 33 (continued)

FIRST GRADE

MODEL	DV	n	PRIOR TEST	INCOME	HHSIZE	MOMED	R^2
Bank St.	F72 WA	60	.77***S72 WA	.16	.02	.05	.62
	S73 WA		.77***F72 WA	-.15	.01	-.03	.59
Kansas	F72 WA	77	.73***S72 WA	.20**	-.23**	.01	.67
	S73 WA		.56***F72 WA	.09	-.12	.27**	.53
EDC	F72 WA	68	.67***S72 WA	.09	-.24*	-.01	.58
	S73 WA		.84***F72 WA	.05	.06	.03	.69
NFT	F72 WA	104	.74***S72 WA	.17**	-.03	.04	.61
	S73 WA		.79***F72 WA	.08	-.03	-.04	.65
Bank St.	F72 Rdg	60	.68***S72 Rdg	.02	.09	.18	.52
	S73 Rdg		.82***F72 Rdg	.15	-.05	-.04	.68
Kansas	F72 Rdg	77	.66***S72 Rdg	.19*	-.19*	.15	.62
	S73 Rdg		.50***F72 Rdg	.14	-.19	.11	.42
EDC	F72 Rdg	68	.75***S72 Rdg	.20*	-.17*	.05	.70
	S73 Rdg		.86***F72 Rdg	-.10	.10	.02	.68
NFT	F72 Rdg	104	.60***S72 Rdg	.18*	.05	.09	.40
	S73 Rdg		.80***F72 Rdg	.01	-.07	-.07	.63
Bank St.	F72 Mth	60	.76***S72 Mth	-.18*	.27**	.15	.65
	S73 Mth		.66***F72 Mth	-.07	-.06	.12	.50
Kansas	F72 Mth	77	.57***S72 Mth	.36***	-.24**	.06	.55
	S73 Mth		.58***F72 Mth	.17	-.09	.27***	.60
EDC	F72 Mth	68	.72***S72 Mth	.14	-.12	-.07	.56
	S73 Mth		.84***F72 Mth	-.06	-.01	-.05	.68
NFT	F72 Mth	104	.64***S72 Mth	.21**	.06	.06	.47
	S73 Mth		.77***F72 Mth	.04	-.14*	-.16*	.59

* $p < .05$
**$p < .01$
***$p < .001$

cont'd

Table 33 (continued)

SECOND GRADE

MODEL	DV	n	PRIOR TEST	INCOME	HHSIZE	MOMED	R^2
Bank St.	F72 Rdg	74	.80***S72 Rdg	.12	-.11	-.08	.67
	S73 Rdg		.81***F72 Rdg	-.09	.07	.10	.66
Kansas	F72 Rdg	52	.83***S72 Rdg	.01	.07	.11	.71
	S73 Rdg		.65***F72 Rdg	.19	-.14	-.03	.50
EDC	F72 Rdg	68	.71***S72 Rdg	.02	-.00	.27***	.64
	S73 Rdg		.80***F72 Rdg	-.08	-.01	-.03	.61
NFT	F72 Rdg	100	.84***S72 Rdg	.15**	-.06	.00	.81
	S73 Rdg		.80***F72 Rdg	.11	.08	.03	.69
Bank St.	F72 Sp	74	.91***S72 Sp	.09	-.12*	-.12*	.82
	S73 Sp		.88***F72 Sp	.11*	.03	.03	.84
Kansas	F72 Sp	52	.87***S72 Sp	.10	-.06	.08	.83
	S73 Sp		.80***F72 Sp	.03	-.07	-.13	.65
EDC	F72 Sp	68	.76***S72 Sp	.01	-.07	.24***	.71
	S73 Sp		.89***F72 Sp	-.03	-.01	-.01	.79
NFT	F72 Sp	100	.81***S72 Sp	.11*	-.04	.12*	.77
	S73 Sp		.99***F72 Sp	-.10*	.07	-.09*	.85
Bank St.	F72 Mth	74	.74***S72 Mth	.09	-.09	-.09	.57
	S73 Mth		.76***F72 Mth	.02	.08	.14	.62
Kansas	F72 Mth	52	.81***S72 Mth	.07	-.05	-.06	.70
	S73 Mth		.39** F72 Mth	.19	-.11	-.05	.23
EDC	F72 Mth	68	.83***S72 Mth	-.08	.02	.05	.69
	S73 Mth		.82***F72 Mth	.05	.06	-.09	.63
NFT	F72 Mth	100	.82***S72 Mth	.09	-.08	.04	.72
	S73 Mth		.75***F72 Mth	.05	-.03	.03	.60

* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 34

Table 14 (p. 72) Broken Down by Model:
Standardized Regression Coefficients and Total R Squared for Pairs of Equations by Grade: Test on a) Prior Test and SES and b) Prior Test and Home Educational Environment (HEE)

		KINDERGARTEN			
		(a)		(b)	
MODEL	DV	SES	R^2	HEE	R^2
Bank St.	F72 Sounds	.19	.53	.22*	.54
	S73 Word A.	.14	.31	-.23	.33
Kansas	F72 Sounds	.13	.39	.24*	.43
	S73 Word A.	-.02	.30	.06	.30
EDC	F72 Sounds	-.03	.16	.21	.20
	S73 Word A.	.05	.21	-.07	.21
NFT	F72 Sounds	-.11	.40	.20*	.42
	S73 Word A.	.23**	.45	.20*	.43
Bank St.	F72 Reading	-.11	.45	.19	.47
	S73 Reading	.15	.28	-.10	.27
Kansas	F72 Reading	.07	.45	.16	.46
	S73 Reading	-.04	.05	.11	.06
EDC	F72 Reading	-.29**	.46	.24*	.44
	S73 Reading	-.17	.12	-.21	.14
NFT	F72 Reading	-.07	.19	.18	.21
	S73 Reading	.26**	.41	.19*	.38
Bank St.	F72 Numbers	-.03	.53	.16	.56
	S73 Math	.25*	.47	.03	.41
Kansas	F72 Numbers	.07	.35	-.05	.35
	S73 Math	.01	.22	.08	.22
EDC	F72 Numbers	-.12	.26	.27*	.31
	S73 Math	-.13	.34	-.20	.37
NFT	F72 Numbers	.09	.35	.02	.34
	S73 Math	.20*	.33	.23*	.35

* p .05 ** p .01 *** p .001

cont'd

Table 34 (continued)

FIRST GRADE

MODEL	DV	(a) SES	R²	(b) HEE	R²
Bank St.	F72 Word An.	.18*	.62	-.01	.59
	S73 Word An.	-.14	.57	-.06	.56
Kansas	F72 Word An.	.03	.62	.22**	.66
	S73 Word An.	.17	.47	.06	.44
EDC	F72 Word An.	-.07	.54	.08	.55
	S73 Word An.	.11	.70	.11	.70
NFT	F72 Word An.	.16*	.60	.15*	.60
	S73 Word An.	.09	.65	.10	.65
Bank St.	F72 Reading	.21*	.53	.11	.50
	S73 Reading	.08	.67	.10	.67
Kansas	F72 Reading	.16*	.58	.24**	.61
	S73 Reading	.10	.38	-.03	.37
EDC	F72 Reading	.04	.65	.12	.66
	S73 Reading	-.02	.67	.02	.68
NFT	F72 Reading	.31***	.45	.15	.37
	S73 Reading	-.03	.62	.14*	.64
Bank St.	F72 Math	-.09	.57	.12	.58
	S73 Math	.09	.48	.13	.49
Kansas	F72 Math	.31***	.52	.13	.44
	S73 Math	.10	.52	.11	.52
EDC	F72 Math	-.05	.54	.12	.55
	S73 Math	-.04	.68	-.02	.67
NFT	F72 Math	.28***	.49	.12	.43
	S73 Math	-.06	.56	.04	.56

* $p < .05$
** $p < .01$
*** $p < .001$

cont'd

Table 34 (continued)

SECOND GRADE

MODEL	DV	(a) SES	R^2	(b) HEE	R^2
Bank St.	F72 Reading	.07	.65	.02	.65
	S73 Reading	-.00	.65	.03	.65
Kansas	F72 Reading	-.05	.70	.12	.71
	S73 Reading	.27**	.53	.16	.48
EDC	F72 Reading	.03	.57	.04	.57
	S73 Reading	-.11	.61	.22**	.65
NFT	F72 Reading	.23***	.83	.01	.79
	S73 Reading	.13*	.69	-.01	.67
Bank St.	F72 Spelling	.00	.80	.05	.80
	S73 Spelling	.07	.83	.04	.82
Kansas	F72 Spelling	.06	.81	.10	.82
	S73 Spelling	.05	.64	.10	.64
EDC	F72 Spelling	.03	.65	.07	.65
	S73 Spelling	-.04	.79	.05	.80
NFT	F72 Spelling	.21***	.78	.10*	.75
	S73 Spelling	-.11*	.84	.02	.83
Bank St.	F72 Math	.03	.56	.08	.56
	S73 Math	.10	.61	-.11	.61
Kansas	F72 Math	-.16*	.72	.02	.69
	S73 Math	.08	.20	.06	.20
EDC	F72 Math	-.08	.69	.05	.69
	S73 Math	-.06	.63	.09	.63
NFT	F72 Math	.20***	.74	-.01	.70
	S73 Math	.14*	.61	.01	.59

* $p < .05$
** $p < .01$
*** $p < .001$

APPENDIX G

ANALYSES USING DIFFERENT METRICS

APPENDIX G

ANALYSES USING DIFFERENT METRICS

In order to look at the effect of using different test metrics, two analyses were performed. Each used the Total Reading score for the first grade sample in Philadelphia. The first analysis was to compute the correlations between log income and test scores (including gains) using four metrics: scores standardized on the sample, the publishers standard scores, grade equivalents and percentiles. The correlations are presented in Table 35. The correlations are quite similar across the metrics with the biggest difference existing for the correlation with Growth Difference in grade equivalents.

The second metric analysis involved calculating the means for test scores and gains in five metrics for the Poor and Non-Poor groups. The t-tests were also calculated for the Poor/Non-Poor difference. The significance levels are the same for all five metrics with the exception of grade equivalents on the Spring 1973 scores. These figures are presented in Table 36.

TABLE 35

Correlations between Total Reading Scores in Various Metrics and Log Income in the First Grade Philadelphia Sample (n≐ 350)

	STD[1]	PSTD[2]	GE[3]	PCT[4]
Spring 1972	-.024	-.004	-.005	.028
Fall 1972	.127*	.126*	.126*	.129*
Spring 1973	.087	.072	.084	.091
Summer Gain	.172***	.149**	.151**	.166**
School Year Gain	-.064	-.072	-.007	-.037
Growth Difference (S73-F72)-(F72-S72)	-.155**	-.141*	-.088	-.141

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[1] Standardized on the Philadelphia sample

[2] Publishers Standard scores

[3] Grade Equivalents (published)

[4] Percentiles (published)

TABLE 36

Total Reading Scores and Gains by Poor/Non-Poor in Several Metrics for the Philadelphia First Grade Sample

TIME OF TESTING AND METRIC	POOR	NON-POOR	SD	DIFF (NP-P)	t
Spring 1972					
Raw	38.8	40.4	16.1	1.6	.84
Standardized*	-.02	.08	1.0	.10	.84
Standard**	35.8	37.0	9.3	1.2	1.08
Grade Equivalent	1.8	1.8	.5	0	0
Percentile	38.5	41.2	28.7	2.7	.79
Fall 1972					
Raw	39.4	45.3	15.3	5.9	3.24***
Standardized	-.11	-.27	1.0	.38	3.19***
Standard	36.4	40.0	8.7	3.6	3.48***
Grade Equivalent	1.8	2.0	.5	.2	3.36***
Percentile	24.4	33.3	23.9	8.9	3.13***
Spring 1973					
Raw	41.5	48.1	18.4	6.6	3.01**
Standardized	-.15	.21	1.0	.36	3.03**
Standard	46.5	49.5	9.4	3.0	2.68**
Grade Equivalent	2.3	2.6	.7	.3	3.60***
Percentile	29.6	39.0	26.4	9.4	2.99**
Summer Gain					
Raw	.7	4.9	12.5	4.2	2.82**
Standardized	-.09	.18	.77	.27	2.95**
Standard	.6	3.0	7.0	2.4	2.88**
Grade Equivalent	.01	.14	.4	.13	2.73**
Percentile	-14.0	-7.9	21.0	6.1	2.44**
School Year Gain					
Raw***	-	-	-	-	-
Standardized	-.04	-.06	.7	-.02	.24
Standard	10.1	9.5	7.3	-.6	.69
Grade Equivalent	.6	.6	.5	0	0
Percentile	5.2	5.8	17.6	.6	.29

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* Standardized on the sample to a mean of 0 and sd of 1.

** Publishers expanded scores.

*** Raw gain cannot be calculated over school year since fall 1972 and spring 1973 tests are different batteries.

APPENDIX H

CONTENT OF SUBTESTS BY TEST BATTERY

APPENDIX H

CONTENT OF SUBTESTS BY TEST BATTERY

Below are descriptions of the subtests in each battery taken directly from the "Tester's Directions" for the Metropolitan Achievement Tests (Durost et al., 1971).

CONTENT OF PRIMER BATTERY

Listening for Sounds

39 items measure pupils' knowledge of beginning and ending sounds and sound-letter relationships. Twenty-two of these items are based on pictures; eight items are based on letters; nine items use single words

Reading

33 items measure pupils' beginning reading skills. Eleven items require pupils to identify letters; fourteen items require pupils, when given a picture of some common object, to select from four words the one word that describes the picture; five items require pupils to select one of three easy sentences which best describes a picture.

Numbers

34 items measure pupils' understanding of basic mathematical principles and relationships. Twenty items cover counting, measurement, numeral recognition, etc.; fourteen items measure pupils' ability to add and subtract one-digit numbers.

CONTENT OF PRIMARY I BATTERY

Word Knowledge

35 items measure extent of pupils' reading vocabulary. Pupils are given a picture of some common object and must select from four words the one word that describes the picture. Words are generally from primary level readers.

Word Analysis

40 items measure pupils' knowledge of sound-letter relationships or skill in decoding. Pupils must identify a dictated word from among several words with similar configurations and sound patterns.

Reading

42 items measure pupils' comprehension of written material. Thirteen items require pupils to select one of three easy sentences which best describes a picture. Nineteen items require pupils to read simple paragraphs and answer questions about what they have read.

Mathematics--Part A: Concepts

35 items measure pupils' understanding of basic mathematical principles and relationships. Items cover counting, place value, sets, measurement, etc.

Part B: Computation

27 items measure pupils' ability to add and subtract one- and two-digit numbers with no regrouping.

CONTENT OF PRIMARY II BATTERY

Word Knowledge

40 items measure extent of pupils' reading vocabulary. Seventeen items are in the word-picture association format. Twnety-three items require pupils to identify a synonym, antonym, or classification for a given word.

Word Analysis

35 items measure pupils' knowledge of sound-letter relationships or skill in decoding. Pupils must identify a dictated word from several printed words which have similar configurations or sound patterns.

Reading

44 items measure pupil's comprehension of written material. Thirteen items require pupils to select one of three sentences which best describes a given picture. Thirty-one items require pupils to read a paragraph and answer questions about what they have read.

Spelling

30 items measure pupils' ability to spell commonly used words. The test uses the familiar format in which the teacher reads a word and pupils write the correct spelling.

Mathematics: Computation

33 items measure pupils' ability to compute. Items cover addition of one- and two-digit numbers, three addends and missing addends, subtraction of one-, two- and three-digit numbers, and a few simplet multiplications. Some regrouping and horizontal notation are introduced.

Mathematics: Concepts

40 items measure pupils' understanding of basic mathematical principles. Place value, measurement, laws and properties of number systems, arrays, sets, inequalities, ets., are covered.

Mathematics: Problem Solving

35 items measure pupils' ability to apply knowledge in solving numerical problems. About one half of the items are dictated to pupils, whereas pupils read the remaining problems to themselves. Problems cover addition, subtraction, multilication and division processes, rate, multiple-step problems, and use of number sentences.

CONTENT OF ELEMENTARY BATTERY

Word Knowledge

50 items measure extent of pupils' reading voacbulary. Items require pupils to identify synonyms, antonyms, or word classification. Items range from primary level to junior high level in difficulty.

Reading

45 items measure pupils' ability to comprehend written material. Pupils read a paragraph and then answer questions about it. Items cover comprehending literal meanings of passages, drawing inferences from the material, identifying main ideas, and determining word meanings from context.

Language

50 items measure pupils' knowledge of basic conventions in standard written English. Fifteen items require pupils to identify whether given sets of words are "telling" sentences, "asking" sentences, or not sentences at all. Thirty-five items require pupils to identify errors in punctuation, capitalization, or usage in written material.

Spelling

40 items measure pupils' ability to spell commonly used words. The test uses the familiar format in which the teacher dictates a word and pupils write the correct spelling.

Mathematics: Computation

40 items measure pupils' ability to compute. Items include 10 addition, 9 subtraction, 7 multiplication, and 7 division examples with integers (some requiring regrouping and some in horizontal notation) and 7 items on decimals and fractions.

Mathematics: Concepts

40 items measure pupils' understanding of important mathematical principles and relationships. Concepts covered include laws and properties of number systems, measurement and geometry, place value, sets, etc.

Mathematics: Problem Solving

35 items measure pupils' ability to apply knowledge in solving numerical problems. Items cover application of ASMD processes to everyday problems, chart reading, and use of number sentences.

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